Public Health Reports

VOLUME 58 JANUARY 1, 1943 NUMBER 1

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol. 58 • JANUARY 1, 1943 • *No. 1*

COCCIDIOIDOMYCOSIS IN WILD RODENTS. A METHOD OF DETERMINING THE EXTENT OF ENDEMIC AREAS [1]

By C. W. EMMONS, *Principal Mycologist, United States Public Health Service*

The occurrence of coccidioidomycosis in wild rodents has been previously reported (*3*, *6*, *7*). The character of the lesions and the prevalence of the disease in some species of rodents, in contrast to its infrequent occurrence in other species, was interpreted to indicate that certain wild animals living in areas where the disease is endemic constitute a natural reservoir. The animals collected in these earlier studies were trapped in the vicinity of San Carlos, Ariz None of the trapping areas were in proximity to human dwellings

The purpose of this paper is to report that coccidioidomycosis has now been found in rodents in other areas This finding establishes the fact that the occurrence of the disease in rodents is not an isolated phenomenon; it further supports the concept that rodents constitute a reservoir of importance in the epidemiology of the disease; and it suggests a method of determining the geographical extent of endemic areas.

The data to be reported were obtained from a rapid survey [2] of the rodent population made in five areas in New Mexico and Arizona These areas and the species of rodents trapped in each are listed in table 1. Previously recognized human cases of coccidioidomycosis or evidence from skin testing had already indicated that the Tucson, Casa Grande, and Phoenix areas were within the endemic localities of the disease (*2*, *8*, *10*). No such evidence was available from the Lordsburg, N. Mex., and Wilcox, Ariz , areas. Between September 3 and October 9, 1942, 1,942 rodents were trapped and examined. Of these, 312 were caught in box traps and killed just before examination. The remainder were caught in snap traps and, with few exceptions, were dead when found. Cultures were made from 207 animals, in most cases in triplicate. Most of these were made from those

[1] From the Division of Infectious Diseases, National Institute of Health

[2] The investigation was aided by Medical Director N E Wayson, Medical Officer in Charge, Plague Suppressive Measures, U S. Public Health Service, San Francisco, who permitted the temporary diversion for the purposes of this study of one of the mobile laboratory units of that office The unit was operated by Dicran V. Turkian and John W Anderson, who assisted with the mycological studies while carrying on the usual routine examinations for plague.

species of rodents which previous experience had shown were most likely to have mycotic infections. Cultures were made in the open with little protection from wind and dust, and the number of contaminated cultures was high. On a few days weather conditions were so unfavorable that no cultures were made. For these reasons the data obtained are qualitative rather than quantitative.

TABLE 1.—*Animals trapped, tabulated according to species and trapping area*

	Lordsburg	Wilcox	Tucson	Casa Grande	Phoenix	Total
Perognathus baileyi		12	80	5	3	100
P. intermedius and *P. penicillatus*	16	21	74	70	42	223
P. apache			2	9		11
P. flavus	3			4		7
Dipodomys merriami	117	52	142	223	114	648
D. ordii	39	13				52
D. spectabilis	21	20		13	2	56
Onychomys leucogaster	84	54				138
O. torridus		2	22	21	11	56
Peromyscus eremicus	32	34	11	50	10	137
P. maniculatus	40	21	1			62
Neotoma albigula	166	112	30	9	4	321
Citellus harrisi	3	2	21	6	4	36
C. spilosoma	30	9				39
C. tereticaudus			43	7		50
Sylvilagus auduboni	2			1	1	4
Reithrodontomys megalotis	2					2
Total	555	352	426	418	191	1,942

As in the previous studies (*6*, *7*) infection was determined by observing typical lesions in the lung or by isolating a fungus in culture from the lung. The latter is a more productive method since many animals without grossly visible lesions yield positive cultures, and the findings by cultural methods can be confirmed by subsequent microscopic examination of tissue sections. Five infected animals were collected in the Wilcox area, and 20 in the Tucson, 21 in the Casa Grande, and 12 in the Phoenix areas (table 2). *Coccidioides immitis* was isolated from 3 animals at Tucson, 3 at Casa Grande, and 1 at Phoenix. From the other infected animals *Haplosporangium parvum* (*7*) was isolated, except that in 3 cases typical lesions were seen but no pathogen was obtained in pure culture. *C. immitis* was isolated from specimens of *Perognathus intermedius*, *P. penicillatus*, *P. baileyi*, and *Dipodomys merriami*. *H. parvum* was obtained from specimens of *P. intermedius*, *P. penicillatus*, *P. baileyi*, *D. merriami*, *Onychomys leucogaster*, and *O. torridus*. As in previous series, species of Perognathus were most important as hosts.

Fewer grossly visible lesions were observed in these animals than in those collected previously. While this may represent an actual geographical difference it seems much more probable that it was due to other factors, possibly to the age of the animals. A few of the animals in the present series were of immature size. Many others, although they had reached approximately adult size, exhibited

pelage markings or other characteristics indicating immaturity. It seems probable that a large proportion of the animals were not more than a few weeks or a few months old. Animals in which no lesions were seen, but from which fungi were isolated, might have developed granulomas had they lived for a longer interval after infection. Earlier studies (*3*) have indicated that the disease progresses slowly in natural infections in these animals.

TABLE 2.—*Animals tabulated according to trapping area and identity of fungus isolated in culture*

	Lordsburg	Wilcox	Tucson	Casa Grande	Phoenix	Total
Number of animals trapped	555	352	426	418	191	1,942
Number of animals examined by culture	36	19	53	59	40	207
Animals from which *C. immitis* was isolated	0	0	3	3	1	7
Animals from which *H. parvum* was isolated	0	4	16	17	11	50
Animals with typical lesions but no pathogen isolated	0	1	1	1	0	3

Although the numbers of infected animals are not great the data indicate clearly that coccidioidomycosis is present in the Tucson, Casa Grande, and Phoenix areas, and that it probably is not present in the Lordsburg area. The evidence for the Wilcox area is not so clear, but the presence of *H. parvum* in rodents caught near Wilcox is interpreted, for reasons enumerated below, to mean that Coccidioides is probably present there also.

The two fungi have been found closely associated in previous studies. *Haplosporangium parvum*, first isolated from rodents near San Carlos, was described in an earlier publication (*7*). As explained in that report, it causes microscopic lung lesions in wild rodents and in experimentally infected white mice; it appears to be associated in wild rodents in some cases with granulomas indistinguishable from those caused by *C. immitis;* it is found in those species of rodents naturally infected with *C. immitis* but rarely or not at all in other closely associated species; and a skin testing material prepared from it appears to have an antigen in common with coccidioidin. It seems evident that there is some relationship between *H. parvum* and *C. immitis*. For the present, therefore, the isolation of *H. parvum* from the rodents of a given area is taken to indicate that *C. immitis* is probably also present in that area. The small number of cultures made may explain the failure to isolate *C. immitis* from the Wilcox area.

Evidence from epidemiological studies and case histories shows that the spores of Coccidioides must be present in windblown dust (*4*, *5*, *9*). The presence of coccidioidomycosis in rodents might be explained by assuming, as earlier theories have held, that the fungus

grows in soil, and that susceptible rodents, because of their intimate contact with soil, inevitably become infected. It seems more probable, for reasons given elsewhere (*6*), that the disease is primarily a rodent disease, transmitted frequently but accidentally to man through the medium of soil contaminated by rodents. It must be remembered that so far as is known coccidioidomycosis is not normally transmitted from man to man, and that no evidence has been presented that it can become established in a new area by the migration of infected persons. Other factors—perhaps climate, perhaps the presence of suitable animal species as hosts—are apparently necessary. Otherwise the disease must long ago have been spread far beyond the geographical limits of the San Joaquin Valley and the Southwest. It may be significant that species of Perognathus and Dipodomys in which coccidioidomycosis has been most frequently found range only in southwestern United States and northern Mexico (*1*).

Although it has not been finally determined whether *C. immitis* is primarily a soil inhabiting saprophyte or primarily a pathogen of rodents, it can be pointed out that in either case a sampling of the rodent population of an area offers a quick and dependable method of determining whether Coccidioides is present. This is an important consideration in the choice of an area into which a large susceptible human population is to be moved. Large numbers of such susceptible individuals are now concentrated in some of the areas mentioned above. While cases of clinical importance appear to be rare in the native human population of endemic areas, numerous cases of the disease must be expected when adults are brought in from nonendemic areas. Some will be of such severity as to entail hospitalization and considerable loss of time, and it is probable that a small percentage will develop the chronic type of the disease, coccidioidal granuloma.

Two methods of determining the presence of coccidioidomycosis in an area are available. Persons can be skin tested with coccidioidin, and samples of the rodent population can be examined by the laboratory methods just outlined. Certain disadvantages inherent in the first method decrease its accuracy in tracing the precise limits within which the fungus is established. The human population shifts, and the exposure experienced during a few hours spent in an endemic area can be sufficient to evoke skin sensitivity (*9*). The use of coccidioidin necessitates the skin testing of a large number of people, and these individuals should be young children or others who have never traveled outside the area under investigation. The rodent population, on the other hand, is localized and adequate samples can be easily taken. The presence of *C. immitis* in a given area would appear to be more easily and clearly proved by its actual demonstration in cultures made from the lungs of native wild rodents than by the demonstration of coccidioidin sensitivity in the human population.

SUMMARY

Coccidioidomycosis was found in wild rodents in additional localities in Arizona. It was not found in an area examined in New Mexico. Rodents appear to constitute a natural reservoir of the disease, and the presence of susceptible species may explain the endemicity of coccidioidomycosis. It is suggested that examination and culture of the lungs from samples of the rodent population (particularly of species of Perognathus) offer a quick and dependable method of determining whether Coccidioides is present in a specific locality. This information may be of value in deciding whether unnecessary risk is involved in the concentration in certain areas of individuals from nonendemic areas.

REFERENCES

(*1*) Anthony, H. E.: Field book ot North American Mammals. Putnam, New York, 1928.
(*2*) Aronson, J. D., Saylor, R. M., and Parr, E. O.: Relationship of coccidioidomycosis to calcified pulmonary nodules. Arch. Path., **34**: 31–48 (1942).
(*3*) Ashburn, L. L., and Emmons, C. W.: Pathology of spontaneous coccidioidal granuloma in the lungs of wild rodents. Arch. Path., **34**: 791–800 (1942).
(*4*) Dickson, Ernest C.: Coccidioides infection. Arch. Int. Med., **59**: 1029–1044 (1937).
(*5*) Dickson, Ernest C., and Gifford, Myrnie A.: Coccidioides infection (coccidioidomycosis). II. The primary type of infection. Arch. Int. Med., **62**: 853–871 (1938).
(*6*) Emmons, C. W.: Isolation of Coccidioides from soil and rodents. Pub. Health Rep., **57**: 109–111 (1942).
(*7*) Emmons, C. W., and Ashburn, L. L.: The isolation of *Haplosporangium parvum* n. sp. and *Coccidioides immitis* from wild rodents Their relationship to coccidioidomycosis. Pub. Health Rep., **57**: 1715–1727 (1942).
(*8*) Farness, O. J.: Coccidioidomycosis. J. Am. Med. Assoc., **116**: 1749–1752 (1941).
(*9*) Smith, Charles E: Epidemiology of acute coccidioidomycosis with erythema nodosum. Am. J. Pub. Health, **30**: 600–611 (1940).
(*10*) Woolley, Mildred T.: Mycological findings in sputum. J. Lab. Clin. Med., **23**: 553–565 (1938).

THE BACTERIOSTATIC ACTION OF SULFONAMIDE COMPOUNDS UPON CLOSTRIDIA [1]

By SANFORD M. ROSENTHAL, *Principal Pharmacologist, United States Public Health Service*

The use of the sulfonamides in the treatment of gas gangrene has been subjected to considerable investigation. The experimental approach has given conflicting results, but the most promising have been brought about by local application of the drugs (*1*, *2*). With this type of therapy it would seem that the effect of the drugs in the test tube might yield information of particular significance concerning

[1] From the Division of Chemotherapy, National Institute of Health.

their action in infected wounds. Therefore a series of sulfonamide and related compounds has been tested on six types of clostridia in an effort to determine their relative bacteriostatic power.

REVIEW OF THE LITERATURE

Spray (*3*) investigated the effects of sulfanilamide, sulfanilyl sulfanilamide, and prontosil upon various clostridia grown in dextrose peptone water. Sulfanilamide in concentrations of 0.2 to 0.05 percent was bacteriostatic for *Cl. tetani, novyi, septicum,* and *histolyticum,* but little effect was found upon *Cl. welchii, sporogenes, bifermenteres* or *botulinum A.* Burton, McLeod, McLeod, and Mayr-Harting (*4*) studied sulfapyridine, sulfanilamide, and some oxidation products of sulfanilamide. Sulfanilamide and sulfapyridine were inactive, both in broth and in an agar medium, against *Cl. welchii, septicum, novyi,* and *sporogenes.* 4-Nitrobenzene sulfonamide was inhibitory in concentrations of 0.005 to 0.002 percent. Gordon and McLeod (*5*) later employed sulfanilamide, sulfapyridine, and 4-nitrobenzene sulfonamide in the therapy of experimental mouse infections. Little effect from any of them was observed against *Cl. septicum, Cl. novyi,* or *Cl. welchii.*

EXPERIMENTAL

The following organisms were selected for study: *Cl. welchii, Cl. tetani, Cl. septicum, Cl. novyi, Cl. histolyticum,* and *Cl. sporogenes.*[2] A virulent strain of B-hemolytic streptococcus was included for comparison. The medium employed was beef infusion broth containing 2 percent neopeptone and 0.1 percent agar. The presence or absence of 0.2 percent dextrose did not appear to influence the bacteriostatic titres obtained with the drugs.

The tubes were placed in boiling water for 30 minutes and cooled immediately prior to inoculation. No vaseline seal was employed. The organisms were transferred from 18-hour cultures made in broth containing whole meat powder. The inocula consisted of approximately 2,000 bacteria. Concentrations of the drugs were begun at 0.1 percent except where insolubility precluded this concentration.

RESULTS

Amino compounds.—It is seen from table 1 that sulfanilamide, sulfapyridine, sulfathiazol, sulfadiazine, and 4,4′-diaminodiphenylsulfone were inactive or feebly active against all of the clostridia studied with one exception. *Cl. septicum* was inhibited by concentrations of 0.01 to 0.002 percent. In order to determine if this was a peculiarity of the strain employed, tests were repeated on two

[2] Obtained from Associate Bacteriologist Sarah E. Stewart of the National Institute of Health.

TABLE 1.—*The bacteriostatic action of sulfonamides against six species of clostridia*

	Cl welchii		*Cl tetani*		*Cl septicum*		*Cl novyi*		*Cl histolyticum*		*Cl. sporogenes*		*Hemolytic streptococcus*	
	16 hours	24 hours	16 hours	24 hours	16 hours	24 hours	16 hours	24 hours	16 hours	24 hours	16 hours	24 hours	16 hours	24 hours
S. A.	P 1,000	0 1,000	0 1,000	0 1,000	P 10,000	P 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	P 1,000	0 1,000
4-Nitro S. A.	C 50,000	P 50,000	P 100,000	C 10,000	C 10,000	C 10,000	P 10,000	C 10,000	P 10,000	0 10,000	C 10,000	C 10,000	P 1,000	P 1,000
S. P	P 1,000	P 1,000	0 1,000	0 1,000	C 10,000	P 1,000	0 1,000	0 1,000	P 1,000	0 1,000	0 1,000	0 1,000	P 1,000	P 1,000
S. D.	P 1,000	P 1,000	0 1,000	0 1,000	C 10,000	P 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	P 1,000	0 1,000
S. T.	P 1,000	P 1,000	0 1,000	0 1,000	C 10,000	P 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	P 10,000	P 1,000
4-Nitro S. T.	C 10,000	C 10,000	C 10,000	P 10,000	C 50,000	C 5,000	C 50,000	P 1,000	C 5,000	0 5,000	P 1,000	0 1,000	0 5,000	0 5,000
Di-amino sulfone	0 1,000	0 1,000	0 5,000	0 5,000	C 50,000	P 5,000	0 5,000	0 5,000	0 5,000	0 5,000	0 5,000	0 5,000	P 5,000	0 5,000
Nitro Amino Sulfone	C 10,000	C 10,000	P 100,000	P 50,000	C 50,000	C 50,000	C 50,000	P 25,000	P 5,000	P 5,000	C 5,000	0 5,000	P 5,000	0 5,000
4-Nitro S. A.+P. A. B.	C 10,000	C 10,000	C 10,000	C 10,000	C 5,000	C 5,000	C 5,000	C 5,000	P 10,000	0 10,000	C 10,000	0 10,000	P 1,000	P 1,000
S. T.+P. A. B.	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000

Figures represent dilution of one part of drug
0=No inhibition
P=Partial inhibition
C=Complete inhibition
S. A.=Sulfanilamide

S. P.=Sulfapyridine
S. D.=Sulfadiazine
S. T.=Sulfathiazol
P. A. B.=Para-aminobenzoic acid

499123°—43——2

their action in infected wounds. Therefore a series of sulfonamide and related compounds has been tested on six types of clostridia in an effort to determine their relative bacteriostatic power.

REVIEW OF THE LITERATURE

Spray (*3*) investigated the effects of sulfanilamide, sulfanilyl sulfanilamide, and prontosil upon various clostridia grown in dextrose peptone water. Sulfanilamide in concentrations of 0.2 to 0.05 percent was bacteriostatic for *Cl. tetani*, *novyi*, *septicum*, and *histolyticum*, but little effect was found upon *Cl. welchii*, *sporogenes*, *bifermenteres* or *botulinum A*. Burton, McLeod, McLeod, and Mayr-Harting (*4*) studied sulfapyridine, sulfanilamide, and some oxidation products of sulfanilamide. Sulfanilamide and sulfapyridine were inactive, both in broth and in an agar medium, against *Cl. welchii*, *septicum*, *novyi*, and *sporogenes*. 4-Nitrobenzene sulfonamide was inhibitory in concentrations of 0.005 to 0.002 percent. Gordon and McLeod (*5*) later employed sulfanilamide, sulfapyridine, and 4-nitrobenzene sulfonamide in the therapy of experimental mouse infections. Little effect from any of them was observed against *Cl. septicum*, *Cl. novyi*, or *Cl. welchii*.

EXPERIMENTAL

The following organisms were selected for study: *Cl. welchii*, *Cl. tetani*, *Cl. septicum*, *Cl. novyi*, *Cl. histolyticum*, and *Cl. sporogenes*.[2] A virulent strain of B-hemolytic streptococcus was included for comparison. The medium employed was beef infusion broth containing 2 percent neopeptone and 0.1 percent agar. The presence or absence of 0.2 percent dextrose did not appear to influence the bacteriostatic titres obtained with the drugs.

The tubes were placed in boiling water for 30 minutes and cooled immediately prior to inoculation. No vaseline seal was employed The organisms were transferred from 18-hour cultures made in broth containing whole meat powder. The inocula consisted of approximately 2,000 bacteria. Concentrations of the drugs were begun at 0.1 percent except where insolubility precluded this concentration.

RESULTS

Amino compounds.—It is seen from table 1 that sulfanilamide, sulfapyridine, sulfathiazol, sulfadiazine, and 4,4′-diaminodiphenylsulfone were inactive or feebly active against all of the clostridia studied with one exception. *Cl. septicum* was inhibited by concentrations of 0.01 to 0.002 percent. In order to determine if this was a peculiarity of the strain employed, tests were repeated on two

[2] Obtained from Associate Bacteriologist Sarah E. Stewart of the National Institute of Health

TABLE 1.—*The bacteriostatic action of sulfonamides against six species of clostridia*

	Cl welchii		*Cl tetani*		*Cl septicum*		*Cl novyi*		*Cl histolyticum*		*Cl. sporogenes*		*Hemolytic streptococcus*	
	16 hours	24 hours	16 hours	24 hours	16 hours	24 hours	16 hours	24 hours	16 hours	24 hours	16 hours	24 hours	16 hours	24 hours
S. A.	P 1,000	0 1,000	0 1,000	0 1,000	P 10,000	P 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	P 1,000	0 1,000
4-Nitro S. A.	C 30,000	P 50,000	P 100,000	C 10,000	C 10,000	C 10,000	P 10,000	C 10,000	P 10,000	0 10,000	C 10,000	C 10,000	P 1,000	P 1,000
S. P.	P 1,000	P 1,000	0 1,000	0 1,000	C 10,000	P 1,000	0 1,000	0 1,000	P 1,000	0 1,000	0 1,000	0 1,000	P 1,000	P 1,000
S. D.	P 1,000	P 1,000	0 1,000	0 1,000	C 10,000	P 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	P 1,000	0 1,000
S. T.	P 1,000	P 1,000	0 1,000	0 1,000	C 10,000	P 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	P 10,000	P 1,000
4-Nitro S. T.	C 10,000	C 10,000	C 10,000	P 10,000	C 50,000	C 5,000	C 50,000	P 1,000	C 5,000	0 5,000	P 1,000	0 1,000	0 5,000	0 5,000
Di-amino sulfone	0 1,000	0 1,000	0 5,000	0 5,000	C 50,000	P 5,000	0 5,000	0 5,000	0 5,000	0 5,000	0 5,000	0 5,000	P 5,000	0 5,000
Nitro Amino Sulfone	C 10,000	C 10,000	P 100,000	P 50,000	C 50,000	C 50,000	C 50,000	P 25,000	P 5,000	P 5,000	C 5,000	0 5,000	P 5,000	0 5,000
4-Nitro S. A.+P. A. B.	C 10,000	C 10,000	C 10,000	C 10,000	C 5,000	C 5,000	C 5,000	C 5,000	P 10,000	0 10,000	C 10,000	0 10,000	P 1,000	P 1,000
S. T.+P. A. B.	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000	0 1,000

Figures represent dilution of one part of drug
0=No inhibition
P=Partial inhibition
C=Complete inhibition
S. A.=Sulfanilamide
S. P.=Sulfapyridine
S. D.=Sulfadiazine
S. T.=Sulfathiazol
P. A. B.=Para-aminobenzoic acid

additional strains of this organism with essentially similar results. With this exception, these compounds were less active against clostridia than upon a hemolytic streptococcus grown in the same medium.

Nitro compounds.—The findings of Burton et al. on the bacteriostatic power of 4-nitrobenzene sulfonamide against clostridia have been confirmed. Inhibition was obtained in concentrations of 0.01 to 0.001 percent. The nitro derivatives of sulfathiazol, sulfapyridine[3] (not shown in the table), and of 4-nitro-4′-aminodiphenylsulfone were also active in concentrations of 0.02 to 0.002 percent. In contrast to the effect on clostridia, the nitro compounds were of no greater activity than the amino compounds when tested upon the streptococcus.

To investigate the nature of the bacteriostatic action of these nitro compounds, the antagonism of 4-aminobenzoic acid was tested. No antagonism was observed upon either clostridia or streptococcus. With the amino compounds, when inhibition was obtained, it could be abolished by 4-aminobenzoic acid.

Further tests were done upon *Cl. welchii* with the following compounds. The lowest concentration of the drug which produced inhibition in 16 hours is shown in parenthesis (0=no inhibition, P=partial, C=complete):

3-Nitrobenzene sulfonamide (C-50,000)
Sulfanilamido-4-nitro-aniline (P-10,000)
2-Nitrobenzoic acid (P-1,000)
3-Nitrobenzoic acid (P-1,000)
4-Nitrobenzoic acid (P-1,000)
4-Nitrosulfanilic acid (P-1,000)
4-Hydroxy-4′-aminodiphenylsulfone (C-1,000)
Sulfanilic acid (0-1,000)

It is seen that the action of para-nitrobenzene sulfonamide differs from sulfanilamide in the lack of antagonism by para-amino benzoic acid and in the fact that the meta isomer is equally active. Changes in or replacements of the sulfonamide group affect activity to a marked extent.

RELATIONSHIP OF THE BACTERIOSTATIC ACTIVITY TO OXIDATION-REDUCTION POTENTIAL

Experiments were carried out in the sterile medium to determine the effects of the drugs on the redox potential of the medium. Concentrations of methylene blue and indigo disulfonate (1/10,000 molar) were employed as indicators. Conditions were kept similar to those employed in the bacteriostatic tests, and the degree of reduction was estimated after incubation at 37° C. for 16 to 24 hours. The hydrogen ion concentration of the medium, determined with the

[3] Obtained through the courtesy of Dr. Charles L. Fox.

glass electrode, was pH 7.1. In these experiments glucose was omitted from the medium.

Except for zones in contact with air, the medium alone was capable of reducing both indicators. Sulfanilamide in concentrations of 0.1 percent or less did not affect the rate of reduction of either dye. 4-Nitrobenzene sulfonamide inhibited the rate of reduction of methylene blue in concentrations of 0.1 percent, but not in lower concentrations. Reduction of indigo disulfonate by the medium was completely inhibited by the nitro compound in concentrations of 0.1 to 0.01 percent, and partially between 0.002 to 0.0004 percent. It is thus seen that 4-nitrobenzene sulfonamide in concentrations comparable to those causing bacteriostasis can elevate the redox potential of the medium.

SUMMARY

The commonly employed sulfonamide compounds showed little bacteriostatic action against five of six species of clostridia. Only *Cl. septicum* showed appreciable inhibition by compounds of this class.

Nitro derivatives of sulfanilamide, sulfathiazol, sulfapyridine, and 4,4′-diaminodiphenylsulfone were many times more active against these clostridia, although not more active against a hemolytic streptococcus.

The mechanism of action in the nitro compounds differs from that of sulfanilamide in that no antagonism is obtained with p-aminobenzoic acid. Also different from sulfanilamide is an elevation of the redox potential of the medium.

Further study seems indicated to obtain sulfonamides more active against clostridia infections.

REFERENCES

(*1*) Reed, G. B., and Orr, J. H.: Local chemotherapy of experimental gas gangrene. War Med., **2**: 59–78 (1942).

(*2*) Bliss, E. A., and Long, P. H.: Chemotherapy of experimental gas gangrene and tetanus infections in mice. War Med., **1**: 799–810 (1941).

(*3*) Spray, R. S.: Bacteriostatic action of prontosil soluble, sulfanilamide and disulfanilamide on sporulating anaerobes commonly causally associated with gaseous gangrene. J. Lab. and Clin. Med., **23**: 609–614 (1937).

(*4*) Burton, H., McLeod, J. W., McLeod, T. S., and Mayr-Harting, A.: On the relationships between the respiratory activities of bacteria and their sensitiveness to sulfanilamide, p-hydroxylamino and p-nitrobenzenesulfonamide. Brit. J. Exper. Path., **21**: 288–302 (1940).

(*5*) Gordon, J., and McLeod, J. W.: Relative value of sulfonamides and antisera in experimental gas gangrene. Lancet, **1**: 407–409 (1941).

TREATMENT OF YOUNG WHITE MICE INFECTED WITH *LEPTOSPIRA ICTEROHAEMORRHAGIAE* WITH IMMUNE SERUM [1]

By Carl L. Larson, *Assistant Surgeon, United States Public Health Service*

Considerable debate has arisen over the value of convalescent or hyperimmune serum in the treatment of Weil's disease, but little experimental work has been done to clarify the subject. The experiments presented here were designed to test this question and to indicate the value of specific immune serum as a therapeutic agent among mice suffering from leptospirosis. Young white mice are extremely susceptible to infections with *L. icterohaemorrhagiae* (*1*), and infection in them may be inhibited by passive protection (*2*).

Bassett-Smith (*3*) administered immune serum early in the course of the disease to guinea pigs suffering from leptospirosis and found the mortality to be considerably decreased. Serum from a horse immunized against *L. icterohaemorrhagiae* protected guinea pigs against infection with this organism and when given on or before the fourth day of infection, mortality was reduced to 16 percent, but when given beyond this time mortality amounted to 54 percent (*4*).

The strains of *L. icterohaemorrhagiae* used in the experiments to be reported have been carried in this laboratory for a considerable length of time. They have been maintained by passage through generations of young white mice and have a high degree of virulence for such hosts.

Two specimens of serum from human cases convalescent from Weil's disease were studied. Specimen 157 was drawn from the patient 51 days after onset of symptoms and specimen 172 was obtained 28 days after onset. Both samples agglutinated *L. icterohaemorrhagiae* to a titer of 1:100,000.

Plasma, serum, and concentrated serum were obtained from domestic rabbits which were inoculated with living cultures of *L. icterohaemorrhagiae*. No agglutinins against leptospirae were observed in the serum of any of the rabbits used for production of serum prior to the beginning of the immunization process. An initial dose of 0.5 cc. of a 6-day culture of virulent organisms was injected intraperitoneally into a group of 12 normal rabbits. After a week intravenous injection of gradually increasing volumes of cultures every 3 to 4 days was instituted. This was carried on for a period of 103 days during which time a total of 145 cc. of culture was given intravenously. At the end of this period pooled serum from the animals agglutinated *L. icterohaemorrhagiae* to a titer of 1:10,000,000.

Plasma was obtained by drawing 25 cc. of blood from each animal and mixing with equal quantities of 2.5 percent sodium citrate. The

[1] From the Division of Infectious Diseases, National Institute of Health.

plasma was found to have an agglutination titer of 1:1,000,000 against *L. icterohaemorrhagiae*.

One week following the above bleeding 50 cc. of blood were obtained from each animal. The serum obtained from this bleeding agglutinated *L. icterohaemorrhagiae* to a titer of 1:10,000,000. A portion of the serum was precipitated with barium sulfate and the globulin fraction was pressed, freed from diffusible material by dialysis, and dissolved in a quantity of 0.85 percent sodium chloride sufficient to bring it up to one-tenth of the original volume of serum used. The titer of agglutinins increased approximately ten times, although the endpoint was not sharply defined. This material was considered to be 100 percent concentrated immune serum and further dilutions with salt solution were made to obtain 50 percent and 25 percent concentrated immune serum. Table 1 summarizes the serums and plasma used in these experiments.

TABLE 1.—*Summary of serums and plasma tested for therapeutic effect on murine leptospirosis*

Source	Type	Agglutination titer versus *L. icterohaemorrhagiae*
Human	Convalescent serum (157)	1:100,000
Do	Convalescent serum (172)	1:100,000
Rabbit	Normal serum	0
Do	Hyperimmune plasma	1:1,000,000
Do	Hyperimmune serum	1:10,000,000
Do	Concentrated hyperimmune serum	+1:10,000,000 ±1:100,000,000

The method of testing the therapeutic efficacy of the above materials included titration of the infective agent, titration of the specific protective antibodies in the specimen of serum or plasma to be tested, and inoculation of this material into infected mice at suitable intervals in order to observe the therapeutic effects. Mice suffering from leptospirosis were sacrificed soon after the onset of symptoms to provide the infective agent. It had been observed that septicemia was most marked at this time. The liver, spleen, kidneys, and heart were removed, weighed, ground, and made into a 10 percent suspension in 0.85 percent salt solution. This was diluted so that tenfold serial dilutions from 10^{-1} to 10^{-5} were obtained. Doses of 0.3 cc. of these various dilutions were injected into the peritoneal cavity of six mice in order to titrate the infectivity of the tissue suspension.

The serum to be used was observed to insure sterility and then diluted serially with salt solution to the desired endpoint. These various dilutions of serum were then mixed in equal parts with a 10^{-2} suspension of infective material and allowed to stand at room temperature for 1 to 2 hours when 0.6 cc. of the mixture was injected into

the peritoneal cavity of each of five mice for each dilution. This procedure determines the protective titer of the serum.

The desired number of mice were inoculated intraperitoneally with 0.3 cc. of a 10^{-2} suspension of infected tissue and were subsequently used to test the therapeutic value of the serum. Serum either whole or diluted was later injected in 0.3 cc. amounts intraperitoneally into such infected mice at stated intervals.

All mice are observed for a 2-week period following initial infection.

EXPERIMENTAL

The results of tests on plasma separated from the blood of rabbits immunized against *L. icterohaemorrhagiae* are shown in table 2. The infective agent killed all the mice inoculated with a 10^{-2} dilution and 50 percent of those given a 10^{-3} dilution of the material. The plasma protected mice against infection when 0.3 cc. of a 10^{-3} dilution was administered intraperitoneally.

TABLE 2.—*Effect of varying dilutions of immune rabbit plasma administered with an infective dose*[1] *of* L. icterohaemorrhagiae *in young mice*

Dilution of plasma	Dose (cc.)	Survivors at end of 4 days	Survivors at end of 14 days	Ratio of protection
10^{-2}	0.3	6	5	5/6
10^{-3}	.3	6	6	6/6
10^{-4}	.3	6	0	0/6
10^{-5}	.3	6	0	0/6

[1] Infective dose = 0.3 cc of 10^{-2} suspension having 50 percent endpoint of 10^{-3}

Plasma was then tested as a therapeutic agent being given in 0.3 cc. quantities intraperitoneally at intervals of 1, 24, 48, and 72 hours after the infective material had been injected into the test animals. Normal rabbit serum failed to influence the course of the disease in mice. The results obtained (table 3) indicate that hyperimmune plasma is effective in the treatment of leptospirosis in young mice for at least 72 hours after infection has been induced.

TABLE 3.—*Effect of whole immune rabbit plasma and normal rabbit serum administered at varying intervals after an infective dose*[1] *of* L. icterohaemorrhagiae *in young mice*

Type of serum or plasma	Dose (cc.)	Interval (hours) between infecting dose and administration of serum or plasma	Number of mice treated	Number of mice surviving	Percent survivors
Normal serum	0.3	24	24	1	4.2
Immune plasma	.3	1	23	23	100
Do	.3	24	24	20	83.3
Do	.3	48	23	21	91.3
Do	.3	72	24	24	100

[1] Infective dose = 0.3 cc. of 10^{-2} tissue suspension having 50 percent endpoint of 10^{-3}.

The next experiment was devised to determine whether or not the therapeutically effective fraction of hyperimmune serum could be concentrated in the globulin portion of the serum. The results are given in table 4. The serum from which the concentrated globulin was subsequently obtained contained sufficient antibodies to protect all infected mice when given 0.3 cc. of a 10^{-4} dilution intraperitoneally. Concentrated immune serum (100 percent) protected mice against infection in doses of 0.3 cc. of a 10^{-5} dilution, while 50 percent and 25 percent dilutions of concentrated immune serum gave somewhat lower results. It is apparent that protective antibodies against *L. icterohaemorrhagiae* are contained in the globulin fraction of immune serum and may be concentrated by suitable means.

TABLE 4.—*Effect of varying dilutions of immune rabbit serum and concentrated immune rabbit serum (100, 50, and 25 percent) administered simultaneously with an infective dose*[1] *of* L. icterohaemorrhagiae *in young mice*

Type of serum	Dilution of serum	Dose of serum (cc.)	Survivors at end of 4 days	Survivors at end of 14 days	Ratio of protection
Immune serum	10^{-4}	0.3	6	6	6/6
Do	10^{-5}	.3	6	1	1/6
Do	10^{-6}	.3	6	0	0/6
Concentrated immune serum (100 percent)	10^{-4}	.3	6	6	6/6
Do	10^{-5}	.3	6	5	5/6
Do	10^{-6}	.3	6	1	1/6
Concentrated immune serum (50 percent)	10^{-4}	.3	6	6	6/6
Do	10^{-5}	.3	6	3	3/6
Do	10^{-6}	.3	6	2	2/6
Concentrated immune serum (25 percent)	10^{-4}	.3	6	6	6/6
Do	10^{-5}	.3	6	2	2/6
Do	10^{-6}	.3	6	0	0/6

[1] Infective dose=0.3 cc. of 10^{-3} tissue suspension having 50 percent endpoint of $10^{-2.6}$.

NOTE.—All mice given immune serum or concentrated immune serum of dilutions of 10^{-1}, 10^{-2}, and 10^{-3} survived

Immune serum and the concentrated fraction of this serum were then tested on groups of 24 infected mice, 1, 3, 5, and 6 days after exposure to infection (table 5). Both materials tested were effective when administered on the third day. Only about 50 percent of the animals survived when treatment was instituted on the fifth day and none survived when the serum was withheld until the sixth day. As a control, normal rabbit serum was administered in 0.3 cc. doses intraperitoneally to 24 infected mice 24 hours after infection had been induced. All but one of the animals succumbed and presented typical signs and symptoms of leptospirosis.

The value of human convalescent serum in murine leptospirosis was next considered. Table 6 shows that neither of the human serums protected mice against *L. icterohaemorrhagiae* to the same extent as did immune or concentrated immune rabbit serum.

TABLE 5.—*Effect of whole immune rabbit serum and concentrated immune rabbit serum (100 percent) and normal rabbit serum administered at varying intervals after an infective dose*[1] *of* L. icterohaemorrhagiae *in young mice*

Type of serum	Dose of serum (cc)	Interval (days) between infecting dose and administration of serum	Number of mice treated	Number of mice surviving	Percent survivors
Normal serum	0 3	1	24	1	4 2
Immune serum	3	1	24	22	91 7
Do	3	3	24	24	100
Do	3	5	24	10	41 7
Do	3	6	17	0	0
Concentrated immune serum (100 percent)	3	1	24	24	100
Do	3	3	24	22	91 7
Do	3	5	24	14	58 3
Do	3	6	17	0	0

[1] Infective dose—0 3 cc of 10^{-2} tissue suspension having 50 percent endpoint of $10^{-2.6}$.

TABLE 6.—*Effect of varying dilutions of immune rabbit serum, concentrated immune rabbit serum (100 percent), and human convalescent serum administered simultaneously with an infective dose*[1] *of* L. icterohaemorrhagiae *in young mice*

Type of serum	Dilution of serum	Dose of serum (cc)	Survivors at end of 4 days	Survivors at end of 14 days	Ratio of protection
Immune rabbit serum	10^{-3}	0 3	6	6	6/6
Do	10^{-4}	.3	6	6	6/6
Do	10^{-5}	3	6	2	2/6
Do	10^{-6}	3	6	0	0/6
Concentrated immune rabbit serum (100 per cent)	10^{-3}	3	6	6	6/6
Do	10^{-4}	3	6	6	6/6
Do	10^{-5}	3	6	5	5/6
Do	10^{-6}	3	6	2	2/6
Human convalescent serum (157)	10^{-3}	3	6	6	6/6
Do	10^{-4}	3	6	3	3/6
Do	10^{-5}	3	6	0	0/6
Do	10^{-6}	3	6	0	0/6
Human convalescent serum (172)	10^{-3}	3	6	5	5/6
Do	10^{-4}	3	6	0	0/6
Do	10^{-5}	3	6	0	0/6
Do	10^{-6}	3	6	0	0/6

[1] Infective dose=0 3 cc. of 10^{-2} tissue suspension having 50% endpoint of $10^{-3.1}$

NOTE.—All mice given immune serum, concentrated immune serum, or human convalescent serum of dilutions of 10^{-1} and 10^{-2} survived.

Normal serum and the other materials tested for their protective ability were tested on groups of 12 infected mice each, 4 days after administration of the infective dose. The normal rabbit serum did not reduce the mortality among the 12 animals to which it was given but no deaths resulted among any of the groups receiving serums from individuals or animals which contained protective antibodies. It is interesting to observe that in spite of the obvious disparity in protective antibody titer of the immune serums, there was no observed

difference in the therapeutic effect produced when given to mice 4 days after infection had occurred.

TABLE 7.—*Effect of immune rabbit serum, concentrated immune rabbit serum (100 percent), human convalescent serum, and normal rabbit serum when administered 4 days after an infective dose*[1] *of* L. icterohaemorrhagiae *in young mice*

Type of serum	Dose of serum (cc.)	Number of mice treated	Number of mice surviving	Percent survivors
Normal rabbit serum	0.1	12	0	0
Immune rabbit serum	1	12	12	100
Concentrated immune rabbit serum (100 percent)	1	12	12	100
Human convalescent serum (157)	1	12	12	100
Human convalescent serum (172)	1	12	12	100

[1] Infective dose = 0.3 cc. of 10^{-2} tissue suspension having 50 percent endpoint of 10

There can be no doubt from the data presented that human convalescent serum and products obtained from rabbits hyperimmunized against *L. icterohaemorrhagiae* have a marked therapeutic effect upon leptospirosis in young white mice. The effects were most marked when serum or plasma was administered within 96 hours after the mice had been infected. Among 238 infected mice treated on or before the fourth day of infection, 228, or 95.7 percent, recovered, while only 24, or 50 percent, of 48 mice treated on the fifth day recovered. No recoveries were noted when treatment was instituted on the sixth day. Only two, or 3.3 percent, of 60 infected mice given normal rabbit serum failed to succumb to the disease.

SUMMARY

Serum from patients convalescent from Weil's disease and immune rabbit serum and plasma prevent the death of young white mice infected with *L. icterohaemorrhagiae.*

The effect of these materials is marked if administered on or before the fourth day after infection.

REFERENCES

(*1*) Larson, C. L.: Susceptibility of young mice (*Mus musculus*) to *Leptospira icterohaemorrhagiae.* Pub. Health Rep., **56**: 1546–1556 (1941).

(*2*) Larson, C. L.: A protection test in mice for identification of leptospirosis icterohaemorrhagica (Weil's disease). Pub. Health Rep., **56**: 1593–1609 (1941).

(*3*) Bassett-Smith, P. W: A short laboratory study of *Spirochaeta icterohaemorrhagiae.* Parasitology, **11**:198–200 (1918).

(*4*) Noguchi, H.: Etiology of yellow fever. XI. Serum treatment of animals infected with *Leptospira icteroides.* J. Exp. Med., **31**: 159–168 (1920).

HERPES SIMPLEX VIRUS RECOVERED FROM THE SPINAL FLUID OF A SUSPECTED CASE OF LYMPHOCYTIC CHORIOMENINGITIS [1]

By CHARLES ARMSTRONG, *Senior Surgeon, United States Public Health Service*

A strain of herpes simplex virus was isolated at the National Institute of Health from the spinal fluid of a suspected case of lymphocytic choriomeningitis which occurred at Gallinger Municipal Hospital, Washington, D. C. Blood drawn during the attack failed to protect mice against herpes infection, while a sample drawn later had acquired protective properties. Demonstrable antibodies against choriomeningitis were absent from all samples tested.

The history of the patient, as revealed by Gallinger Hospital records kindly supplied by Dr. L. K. Sweet, is as follows:

HISTORY OF CASE

G. T., colored male, 15 years of age, was admitted to Gallinger Municipal Hospital, Washington, D. C., December 4, 1940. He had been quite well until the morning of December 3, 1940, when he awoke with a severe headache; he was both nauseated and dizzy, but did not vomit. His headache continued, became more severe, and he developed a severe pain in his eyes. He was feverish and gradually became stuporous.

Physical findings.—The patient was a fairly well developed and well nourished Negro boy who was semi-stuporous and critically ill; temperature 100.4° F., pulse 100, respiration, 24. Blood pressure 140 mm. mercury, systolic; 75 mm. mercury, diastolic. There was slight opisthotonos and marked nuchal rigidity. The Kernig and Brudzinski signs were positive. The tendon reflexes were normal. Examination of the fundus oculi showed no lesions. No herpes or other significant physical abnormalities were noted.

Laboratory findings.—Blood—erythrocytes, 4.2 million; leucocytes, 14,100; polymorphonuclear neutrophiles, 74 percent (6 percent of which were band forms and 1 percent were younger forms); lymphocytes, 25 percent; basophiles, 1 percent. Urine—normal. Spinal fluid—950 cells, of which 96 percent were lymphocytes and 4 percent were polymorphonuclears. The total protein, 120 mg. percent; sugar, 77 mg. percent; chlorides, 677 mg. percent; colloidal gold curve, .0012221000; reaction to Kahn test, negative; culture, no growth.

Course.—The temperature gradually fell to normal over a period of 4 days. Coincident with this there was a slowing of the pulse rate and marked clinical improvement with disappearance of stupor and

[1] From the Division of Infectious Diseases, National Institute of Health.

evidence of meningeal irritation. On December 14, 1940, 10 days after admission, the spinal fluid contained 69 cells per cubic millimeter, of which 90 percent were lymphocytes and 10 percent polymorphonuclears. The total protein was 80 mg. percent, the colloidal gold curve was .0000000000. The patient continued to be symptom free. On December 21, 1940, the spinal fluid contained only 19 lymphocytes per cubic millimeter.

The patient was discharged in good condition on December 24, 1940. He was seen again on February 15, 1941, at which time he was in good health, without physical abnormalities. He had been free from untoward symptoms since his discharge from the hospital. Clinically the ailment was thought to be choriomeningitis. The recovery, however, was more prompt than usually has been the case with choriomeningitis patients displaying symptoms of corresponding severity.

Isolation of the virus.—A sample of spinal fluid drawn at Gallinger Municipal Hospital on the morning of December 4, 1940, the second day of illness, and another, together with a sample of whole blood, drawn on the afternoon of the same day, were submitted to the National Institute of Health for study. Both spinal fluid samples were sterile to culture on ordinary media. Groups of six mice were inoculated intracerebrally with 0.04 cc. of spinal fluid from each tap, and a group of six mice and one guinea pig were inoculated with a mixture of equal parts of whipped blood and spinal fluid from the afternoon tap. The mice were all from one lot of Swiss mice reared at the National Institute of Health.

No evidence of illness developed except in the group of mice inoculated from the primary spinal tap. Two of these mice died during the night of December 7, 1940, and were partially eaten by cage mates. On December 11 a third mouse developed symptoms resembling choriomeningitis. The brain of this animal was emulsified in saline and a 1:10 and a 1:500 suspension immediately inoculated into groups of five mice each. The mice receiving the heavier suspension all developed a roughened coat and tremors and all died on December 14 with their legs markedly extended backward. One of the mice which received the 1:500 suspension died December 15, and four died December 16; all had symptoms suggesting choriomeningitis.

NATURE OF THE INFECTIOUS AGENT

The fatal ailment in mice has been repeatedly conveyed by emulsions of infected mouse brains which were sterile to culture and in which no organisms were visible in variously stained, or in dark-field preparations.

Filterability.—The supernatant fluid from a centrifuged suspension of finely ground infectious mouse brain suspended in broth passed Berkefeld N. filters which withheld ordinary bacteria.

Resistance to glycerine.—The virus, in mouse brains, has been found to withstand suspension in glycerine (50 percent in saline pH 7.6 at +4° C.) up to 7 months. Survival for longer intervals has not yet been investigated.

Resistance to heat.—The infective agent maintained its virulence after exposure to 45° C. for 30 minutes but was found to be inactivated by exposure to 50° C. for the same interval.

Source of the infectious agent.—The infectious agent, apparently a virus, is believed to have been derived from the spinal fluid of the patient, G. T., since the mice employed in its isolation were from our own laboratory stock, many of which have been inoculated intracerebrally with various materials, including spinal fluids, but without a similar virus having been encountered. Strains of experimental herpes virus have never been in the new building at the National Institute of Health. Moreover, serum-virus protection tests in mice carried out with the patient's serum drawn on January 4, 1940, and on February 4, 1941 (table 1), showed, on repeated trials, a definite increase in demonstrable antibodies to herpes virus in the later drawn sample. Thus, a hum an origin for the virus seemed probable. Demonstrable antibodies against choriomeningitis virus were absent from all samples.

bleedings) and the G. T. strain of virus

Undiluted serum (2 parts)	First test (Jan. 4, 1941) Virus dilution (1 part)	Day of death of mice after inoculation	Mice survived	Repeat test (June 4, 1941) Day of death of mice after inoculation	Mice survived
G. T Early bleeding (Jan 4, 1941)	1 25	5, 5, 8, 8	0	5, 5, 6, 6	0
	1 50	6,6,6,6	0	5, 6, 6, 8	0
	1 100	10, 12	2	1, 7, 8, 9	0
G. T. Late bleeding (Feb 5, 1941)	1 25	7, 7, 11	1	6, 11, 17	1
	1 50	----------	4	13	3
	1 100	----------	4	9	3

CHARACTERISTICS OF THE VIRUS

Infectivity for mice.—Suspensions of infected mouse brains conveyed infection to approximately 50 percent of white mice when 0.03 cc. of a 1:50,000 suspension in saline was inoculated intracerebrally. Infection was brought about, but less readily, by rubbing the virus into the skin, or by subcutaneous, intraperitoneal, or intranasal inoculation, or when given by stomach tube.

Symptoms in mice.—Mice inoculated intracerebrally with 0.03 cc. of concentrated emulsion (1:20) of infected mouse brain developed

rough fur and appeared ill in from 48 to 72 hours. The ailment progressed rapidly and the hind legs tended to become spastic, causing a stilted gait. When such an animal was lifted by the tail it would usually quickly pass into a titanic spasm with both front and hind legs extended backward. These spasms are similar to those seen in mice inoculated intracerebrally with choriomeningitis virus, but come on more suddenly and it is more exceptional for mice to recover temporarily from them than is the case with choriomeningitis infection. Death usually occurs in from 3 to 6 days. Virus is readily recovered from the central nervous system but not from other organs. This picture is strikingly similar to that described by Andervont (*3*) for mice infected with herpes simplex virus. When the virus is rubbed on the scarified skin, or is given subcutaneously into a paw, the mice tend to develop flaccid paralysis of the inoculated limb in from 6 to 10 days. The paralysis usually spreads and death results in from 1 to 3 days after onset.

Susceptibility of other species.—Cotton rats and rabbits are highly susceptible, while rhesus monkeys are resistant.

Culture.—The virus was successfully carried through eight successive transfers on the chorio-allantois of the developing chick embryo.

Pathology in mice.—This account of the findings in mice is summarized from pathological examinations reported by Dr. J. H. Peers, research associate at the National Institute of Health.

Following intracerebral inoculation, a nonhemorrhagic type of meningitis develops. The exudate may contain fibrin, together with mononuclear, lymphoid, and polymorphonulear cells. Foci of intensified meningeal reactions occur when pyknosis and karyorrhexis may be marked. Beneath these foci the process is often found to involve the underlying parenchyma where microglial proliferation is often present. Various degrees of perivascular infiltration occur and may accompany penetrative vessels into the parenchyma. Similar lesions may involve the cerebellum as well as other portions of the brain and may also occur in the cord.

Variously sized, ill-defined areas may be found where the white matter appears loose and stringy and where microgliosis and even definite necrosis which suggests demyelination may occur. The gray matter may also be involved.

When the virus is inoculated into a rear foot, neuritis marked by a cellular infiltration of the sciatic nerve may develop. There may be complete to partial obliteration of neurons from the lumbar cord and the white matter may appear badly disorganized in the cerebellum. Necrosis of Purkinje's cells has been observed.

The choroid plexus of one or more ventricles often shows usually slight lymphocytic infiltration, while the ependyma is thinned or even absent in spots.

VIRUS DIFFERENTIATION

The virus was readily differentiated from choriomeningitis virus by its host range, by the incubation period following its intracerebral inoculation into mice, by the pathology produced, and, to a less extent, by the symptomatology. Cross immunity tests in mice and the serum-virus protection tests further indicated that the two viruses were immunologically distinct.

The virus was also readily differentiated from the Lansing strain of poliomyelitis, the F. A. strain of encephalomyelitis of mice (Theiler), and from the murine virus of Jungeblut and Sanders.

IDENTIFICATION OF THE VIRUS

The virus in all particulars behaved like a strain of herpes simplex. Cross protection tests when carried out between this strain of virus (G. T.) and an established (H. F.) strain of herpes, secured through the courtesy of Dr. T. M. Rivers of the Rockefeller Institute of Medical Research, indicated immunological similarity (table 2).

TABLE 2.—*Cross neutralization tests employing G. T. virus and antiserum, and herpes virus (H. F.) and antiserum*

Undiluted serum (2 parts)	Virus dilution (1 part)	Day of death of mice after inoculation	Mice survived	Undiluted serum (2 parts)	Virus dilution (1 part)	Day of death of mice after inoculation	Mice survived
Anti G. T (rabbit)	G. T.			Anti-herpes (H. F.) (rabbit).	G. T.		
	1:30	7, 7, 1[illegible]	1		1:30	6, 8, 10, 15	0
	1:60	7, 9	2		1:60	10, 12, 13	1
	1:120	----	4		1:120	10	3
Normal rabbit (control).	G. T.			Normal rabbit (control).	G. T		
	1:30	3, 3, 3, [illegible]	0		1:30	5, 5, 5, 7	0
	1:60	3, 3, 4, 4	0		1:60	5, 5, 6, 6	0
	1:120	3, 3, 3, 4	0		1:120	5, 5, 6, 6	0
Anti G. T. (rabbit).	H. F. herpes			Anti-herpes (H. F.) (rabbit)	H. F. herpes		
	1:30	[illegible]	3		1:30	5, 6, 8	1
	1:60	--	4		1:60	8	3
	1:120	----	4		1:120	9	3
Normal rabbit (control).	H. F. herpes			Normal rabbit (control).	H. F. herpes		
	1:30	2, 3, 4	1		1:30	4, 5, 6, 13	0
	1:60	3, 3, 3, 3	0		1:60	5, 5, 9, 9	0
	1:120	4, 4, 4, 5	0		1:120	5, 6, 7, 9	0

DISCUSSION

A strain of herpes simplex virus was isolated from the spinal fluid of a clinically suspected case of choriomeningitis of the meningeal type. Beyond the clinical resemblance, no evidence supporting the diagnosis was adduced, since choriomeningitis virus was not isolated from the spinal fluid and the patient upon recovery showed no demonstrable antibodies against this virus. On the other hand, following his recovery the patient did develop protective antibodies against the

recovered strain of herpes virus. The criteria usually relied upon to establish the etiological agent in virus infections are, therefore, fulfilled, and it seems possible that herpes simplex virus may, in rare instances, be the specific causative agent of a portion of those cases of lymphocytic or aseptic meningitis for which the etiology has not been established.

Herpes simplex is a widely distributed virus and has, on several occasions, been isolated from the spinal fluid of individuals presumably suffering from some other ailment such as encephalitis or syphilis (*4*, *5*, *6*, *8*), so that it was not possible to determine which, if any, of the symptoms were due to the presence of herpes virus. The virus is also reported to have been isolated occasionally from the spinal fluid of persons with herpes (*7*, *8*, *9*).

SUMMARY

A strain of herpes simplex virus was isolated from the spinal fluid of a patient with meningeal symptoms suggesting a mild case of choriomeningitis. Specific herpes neutralizing antibodies developed in the patient's serum following recovery.

No laboratory confirmation of infection with any other virus was elicited.

The evidence suggests that herpes simplex virus may, in rare instances, be the causative agent for a portion of those cases of aseptic or lymphocytic meningitis for which the cause is otherwise undetermined.

REFERENCES

(*1*) Armstrong, Chas., and Lillie, R. D.: Experimental lymphocytic choriomeningitis of monkeys and mice produced by a virus encountered in studies of the 1933 St. Louis encephalitis epidemic. Pub. Health Rep., **49**: 1019–1027 (1934).

(*2*) Armstrong, Chas., and Dickens, Paul F.: Benign lymphocytic choriomeningitis (acute aseptic meningitis), a new disease entity. Pub. Health Rep., **50**: 831–842 (1935).

(*3*) Andervont, H. B.: Activity of herpetic virus in mice. J. Inf. Dis., **44**: 383–393 (1929).

(*4*) Doerr, R., and Schnabel, A.: Das virus des herpes febrilis und seine Beziehungen zum Virus der Encephalitis epidemica (lethargica). Zeitschr. f. Hyg. u. Infektionskrankh., **94**: 29–81 (1921).

(*5*) Flexner, S.: Epidemic lethargic encephalitis and allied conditions. J. Am. Med. Assoc., **81**: 1785–1789 (1923).

(*6*) Doerr, R., and Zdansky, E.: Kritisches und Experimentelles zur ätiologischen Erforschung des Herpes febrilis und der Encephalitis lethargica. Zeitschr. f. Hyg. u. Infektionskrankh., **102**: 1–54 (1924).

(*7*) Ravaut and Babeau: Sur la virulence du liquide céphalorachidien de malade atteinte d'herpès génital. C. R. Société de Biol., **85**: 1132–1133 (1921).

(*8*) Bastai, P.; Busacca, A.. Ueber die Pathogenese des Herpes febrilis: Haufigkeit der Herpesinfektion im latenten Zustande beim Menschen. Münch. Med. Woch., **71**: 1046–1057 (1924).

(*9*) Zurukzoglu, St.: Ueber das Vorkommen von Herpesvirus im Liquor cerebrospinalis. Zentralb. f. Bakteriol., **139**: 86–90 (1937).

DEATHS DURING WEEK ENDED DECEMBER 19, 1942

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Dec. 19, 1942	Corresponding week 1941
Data from 88 cities of the United States		
Total deaths	9,478	8,728
Average for 3 prior years	8,642	
Total deaths, first 50 weeks of year	421,756	417,236
Deaths per 1,000 population, first 50 weeks of year, annual rate	11.8	11.7
Deaths under 1 year of age	674	525
Average for 3 prior years	501	
Deaths under 1 year of age, first 50 weeks of year	29,249	26,483
Data from industrial insurance companies.		
Policies in force	65,272,092	64,742,923
Number of death claims	12,006	12,503
Death claims per 1,000 policies in force, annual rate	9.6	10.1
Death claims per 1,000 policies, first 50 weeks of year, annual rate	9.1	9.4

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED DECEMBER 26, 1942

Summary

Reports for the week ended December 26, 1942, showed an increase in only one, smallpox, of the nine common communicable diseases listed in the following table, and only the reports of meningococcus meningitis were above the corresponding 5-year (1937–41) median. Cumulative figures for the 51 weeks of the year are above the comparable 5-year medians for only measles and meningococcus meningitis.

The reports of meningococcus meningitis for the week declined from a total of 103 to 92. The number for the corresponding week of 1941 is 37, which was also the comparable 5-year median number. Greatest numbers reported for the week were 11 cases in Oregon, 10 in Virginia, 8 each in Indiana and Maryland, and 6 each in Massachusetts, New York, and Pennsylvania. The cumulative figure for the 51 weeks of the current year is 3,582, about 29 percent more than the greatest number for the period since 1937 when the comparable number was 5,307.

There were 23 cases of smallpox reported for the current week, exclusive of an aggregate of 42 cases in Pennsylvania during November and December, 33 of which were at Lewistown and 9 in the vicinity of Lancaster. Of the reports for the current week 13 cases were in Ohio and 6 in Indiana.

Reports of poliomyelitis decreased from 60 to 36 cases for the current week, 10 of which were in California, 7 in Texas, and 4 in New York. The cumulative total for the 51 weeks of the year is 4,143 as compared with 9,051 in 1941, which was also the median number for the period in the past 5 years.

Only 2,290 cases of influenza were reported for the week, as compared with 2,414 for the preceding week and 5-year median of 2,587. Cumulative figures for the 51-week period are 105,727 for the current year, 290,164 for the 5-year median, and 520,153 for the period in 1941. Most of the cases in 1941 occurred in the first few weeks of the year.

Reports of measles decreased from 4,779 to 4,018 cases for the current week. The corresponding median number is 4,544. Greatest numbers for the week were 909 in Pennsylvania, 352 in Massachusetts, and 311 in Washington.

Other reports for the week include 12 cases of amebic, 65 bacillary, and 17 undefined dysentery; 3 cases of infectious encephalitis, 27 of tularemia, and 77 of typhus fever.

The death rate for the week in 88 large cities of the United States was 12.3 per 1,000 population, as compared with 13.2 for the preceding week and a 3-year (1939–41) average of 12.2. The cumulative rate for 51 weeks in 1942 is 11.8, and 11.6 in 1941.

Telegraphic morbidity reports from State health officers for the week ended Dec. 26, 1942, and comparison with corresponding week of 1941 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median, 1937–41	Week ended—		Median, 1937–41	Week ended—		Median, 1937–41	Week ended—		Median, 1937–41
	Dec 26, 1942	Dec. 27, 1941		Dec. 26, 1942	Dec. 27, 1941		Dec. 26, 1942	Dec. 27, 1941		Dec 26, 1942	Dec 27, 1941	
NEW ENG.												
Maine	1	0	0	1	--	-----	13	192	35	5	0	0
New Hampshire	1	0	0	------	--	------	14	6	2	0	2	0
Vermont	0	0	0	------	----	------	159	4	25	0	0	0
Massachusetts	4	1	4	------	---	-----	352	118	178	6	3	1
Rhode Island	0	2	0	--- -	--- --	-----	1	26	3	0	0	0
Connecticut	1	0	1	2	1	1	211	76	67	2	2	1
MID ATL.												
New York	19	11	20	[1] 10	[1] 10	[1] 14	243	344	395	6	5	3
New Jersey	6	12	9	12	17	6	38	38	38	4	3	0
Pennsylvania	7	15	26	3	--	- -	909	533	533	6	1	5
E. NO CEN.												
Ohio	8	7	17	7	14	9	46	47	47	1	0	1
Indiana	8	10	17	9	37	31	75	25	25	8	0	0
Illinois	8	24	33	7	6	19	46	36	36	0	0	0
Michigan [2]	11	4	5	1		1	45	38	253	1	2	0
Wisconsin	3	0	1	31	31	35	164	172	172	3	2	0
W. NO. CEN.												
Minnesota	2	2	2	1	- -	---	2	107	31	1	0	0
Iowa	1	2	4	-	1	5	64	75	75	0	0	0
Missouri	4	10	10	3	5	16	6	27	11	1	0	1
North Dakota	2	1	1	24	17	17	0	133	16	0	0	0
South Dakota	0	3	3	--	--- --	----	147	0	1	0	0	0
Nebraska	3	0	0	5	- --	-----	87	4	4	0	0	0
Kansas	8	3	5	7	10	10	25	117	88	1	1	2
SO. ATL.												
Delaware	0	0	0	---	----	----	0	0	3	0	0	0
Maryland [2]	8	9	9	11	5	8	3	133	9	8	1	1
Dist. of Col	0	0	1	3		3	0	0	3	1	1	0
Virginia	12	32	32	383	260	111	12	103	77	10	3	1
West Virginia	4	6	9	16	17	17	6	92	16	3	0	2
North Carolina	4	14	21	2	1	6	3	212	212	2	0	1
South Carolina	3	12	5	204	203	236	3	45	7	1	1	1
Georgia	6	14	14	71	13	68	13	66	25	2	0	0
Florida	0	9	8	1	16	11	1	2	2	0	0	0
E. SO CEN.												
Kentucky	3	4	7	18	1	16	58	32	32	0	0	3
Tennessee	6	11	7	56	61	61	13	73	55	0	0	1
Alabama	15	12	13	143	59	170	1	5	19	1	3	3
Mississippi [2]	5	8	5	-------	-----	------	-------	-------	-------	0	0	0
W SO CEN.												
Arkansas	6	12	7	41	81	81	58	49	49	0	0	0
Louisiana	9	8	8	9	- .	10	44	3	2	1	2	1
Oklahoma	8	16	16	94	120	120	103	113	9	0	0	0
Texas	21	51	50	823	1, 254	597	16	296	77	2	2	2
MOUNTAIN												
Montana	0	0	0	15	6	6	26	41	14	0	0	0
Idaho	4	1	1	1	------	1	60	4	4	0	0	0
Wyoming	0	0	0	66	10	10	10	3	3	0	1	0
Colorado	8	5	11	34	69	69	27	59	59	3	0	0
New Mexico	0	0	2	3		2	3	6	16	0	0	0
Arizona	0	3	3	83	157	131	1	62	3	0	0	0
Utah [2]	0	0	0	43	27	27	261	48	38	1	0	0
Nevada	0	0	-- --	- ----	------	-------	5	0	------	0	0	------
PACIFIC												
Washington	0	1	2	4	1	-------	311	17	19	1	0	0
Oregon	2	3	2	13	17	71	289	84	13	11	0	0
California	20	14	22	30	60	60	44	546	190	0	2	2
Total	241	352	499	2, 290	2, 587	2, 587	4, 018	4, 212	4, 544	92	37	37
51 weeks	15, 234	16, 620	23, 589	105, 727	520, 153	290, 164	500, 072	860, 850	372, 517	3, 582	1, 902	1, 902

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended Dec. 26, 1942, and comparison with corresponding week of 1941 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1937–41	Week ended—		Median 1937–41	Week ended—		Median 1937–41	Week ended—		Median 1937–41
	Dec. 26, 1942	Dec. 27, 1941		Dec. 26, 1942	Dec. 27, 1941		Dec. 26, 1942	Dec. 27, 1941		Dec. 26, 1942	Dec. 27, 1941	
NEW ENG.												
Maine	0	1	1	8	11	8	0	0	0	0	1	1
New Hampshire	0	0	0	15	9	8	0	0	0	0	1	0
Vermont	0	0	0	1	1	7	0	0	0	0	0	0
Massachusetts	0	0	0	238	196	144	0	0	0	1	3	1
Rhode Island	0	0	0	3	9	7	0	0	0	0	0	0
Connecticut	0	1	0	28	17	54	0	0	0	0	1	0
MID ATL												
New York	4	6	1	279	200	333	0	0	0	3	13	8
New Jersey	0	2	1	47	95	95	0	0	0	0	1	1
Pennsylvania	0	4	1	157	180	276	14	0	0	0	6	9
E NO CEN												
Ohio	0	2	1	243	225	231	13	0	1	0	7	3
Indiana	0	0	0	68	122	125	6	1	5	3	0	2
Illinois	0	2	1	168	182	326	1	1	3	4	[illegible]	1
Michigan [2]	0	0	0	95	160	294	0	0	2	0	[illegible]	2
Wisconsin	0	0	0	204	112	130	0	0	3	0	0	0
W NO CEN												
Minnesota	1	4	1	56	58	58	0	5	17	3	0	0
Iowa	1	0	0	46	[illegible]	72	0	0	4	0	1	1
Missouri	0	0	0	66	78	81	0	0	1	5	0	4
North Dakota	1	0	0	14	5	13	0	1	1	0	0	0
South Dakota	0	1	1	23	37	17	2	0	2	0	0	0
Nebraska	0	0	0	20	24	16	0	0	1	0	0	0
Kansas	0	1	1	46	62	104	0	1	0	2	0	0
SO ATL												
Delaware	0	0	0	2	26	16	0	0	0	0	0	0
Maryland [2]	1	0	0	40	53	46	0	0	0	1	3	3
Dist of Col	0	0	0	12	13	10	0	0	0	0	1	1
Virginia	1	2	1	45	49	35	0	0	0	3	8	4
West Virginia	0	0	1	37	57	61	0	0	0	0	2	1
North Carolina	0	0	0	39	26	40	0	0	0	0	0	1
South Carolina	0	1	0	11	7	10	0	0	0	2	0	0
Georgia	0	0	0	35	13	21	0	0	0	0	2	2
Florida	0	0	0	5	10	8	0	0	0	0	1	1
E SO CEN												
Kentucky	1	2	0	22	48	54	1	0	0	1	2	2
Tennessee	2	2	0	58	70	70	0	0	0	1	1	1
Alabama	0	0	1	22	37	23	0	0	0	3	1	3
Mississippi [2]	2	1	1	2	6	6	0	0	0	1	0	0
W. SO. CEN												
Arkansas	1	0	0	4	6	8	0	1	1	1	0	0
Louisiana	0	0	0	4	8	8	0	0	0	4	9	5
Oklahoma	0	0	1	27	25	25	0	1	1	1	1	1
Texas	7	2	2	39	57	74	0	4	4	4	4	12
MOUNTAIN												
Montana	0	0	0	8	23	23	0	0	1	0	2	0
Idaho	[3] 1	0	0	4	8	8	0	0	1	0	0	0
Wyoming	0	0	0	46	4	4	0	0	0	0	0	0
Colorado	1	1	0	58	16	26	0	0	5	1	0	1
New Mexico	0	0	0	2	5	16	0	0	0	2	1	1
Arizona	2	0	0	3	9	7	0	1	0	2	0	0
Utah [2]	0	2	1	54	13	13	0	0	0	0	0	0
Nevada	0	0	------	3	0	------	0	0	------	0	0	------
PACIFIC												
Washington	0	1	0	9	26	48	0	1	0	0	0	0
Oregon	0	0	0	11	6	20	0	0	0	0	0	0
California	10	1	1	103	103	140	0	0	4	1	3	3
Total	36	39	36	2,530	2,651	3,457	37	17	110	49	80	89
51 weeks	4,143	9,051	9,051	123,995	124,813	158,500	801	1,331	9,456	6,652	8,297	12,630

See footnotes at end of table

Telegraphic morbidity reports from State health officers for the week ended Dec. 26, 1942, and comparison with corresponding week of 1941 and 5-year median—Con.

Division and State	Whooping cough, Week ended— Dec. 26, 1942	Whooping cough, Week ended— Dec. 28, 1941	Week ended Dec. 26, 1942: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENG.											
Maine	39	19	0	0	0	0	0	0	0	0	0
New Hampshire	5	11	0	0	0	0	0	0	0	0	0
Vermont	42	17	0	0	0	0	0	0	0	0	0
Massachusetts	194	125	0	0	1	0	0	0	0	0	0
Rhode Island	26	26	0	0	0	0	0	0	0	0	0
Connecticut	29	38	0	0	0	0	0	0	0	0	0
MID. ATL.											
New York	321	392	0	1	17	0	1	0	0	0	1
New Jersey	130	146	0	1	0	0	0	0	0	0	0
Pennsylvania	253	139	0	0	0	0	0	0	0	2	0
E. NO. CEN.											
Ohio	133	161	0	0	1	0	0	0	0	3	0
Indiana	24	43	0	0	0	1	0	0	0	3	0
Illinois	89	177	0	1	1	0	0	0	0	2	0
Michigan [2]	191	163	0	0	1	0	0	0	0	0	0
Wisconsin	142	258	0	0	0	0	0	0	0	1	0
W. NO. CEN.											
Minnesota	30	30	0	3	0	0	0	0	0	0	0
Iowa	28	13	0	0	0	0	0	0	0	0	0
Missouri	11	19	0	0	0	0	1	0	0	0	0
North Dakota	7	2	0	0	0	0	0	0	0	0	0
South Dakota	1	1	0	0	0	0	0	0	0	0	0
Nebraska	1	2	0	0	0	0	0	0	0	0	0
Kansas	16	40	0	0	0	0	0	0	0	4	0
SO. ATL.											
Delaware	7	0	0	0	0	0	0	0	0	0	0
Maryland [2]	69	21	0	0	0	2	0	0	0	0	0
Dist. of Col.	9	11	0	0	0	0	0	0	0	0	0
Virginia	59	36	0	0	0	12	0	0	0	5	0
West Virginia	4	10	0	0	0	0	0	0	0	0	0
North Carolina	26	100	0	0	0	0	0	0	0	0	12
South Carolina	4	11	0	0	0	0	0	0	0	0	1
Georgia	13	1	0	3	1	0	0	0	0	1	17
Florida	5	11	0	0	0	0	0	0	0	0	3
E. SO. CEN.											
Kentucky	19	39	0	0	0	0	0	0	0	0	0
Tennessee	16	32	0	0	0	1	0	0	0	3	2
Alabama	43	21	0	0	0	0	0	0	0	0	12
Mississippi [2]	--	-	0	0	0	0	0	0	0	0	0
W. SO. CEN.											
Arkansas	26	10	0	1	1	0	0	0	0	1	0
Louisiana	0	1	0	0	0	0	0	0	0	1	1
Oklahoma	15	3	0	0	0	0	1	0	0	0	0
Texas	128	74	0	2	36	0	0	0	0	1	28
MOUNTAIN											
Montana	17	8	0	0	0	0	0	0	0	0	0
Idaho	1	1	0	0	0	0	0	0	1	0	0
Wyoming	6	5	0	0	0	0	0	0	0	0	0
Colorado	6	14	0	0	0	0	0	0	0	0	0
New Mexico	9	23	0	0	2	0	0	0	0	0	0
Arizona	0	51	0	0	0	0	0	0	0	0	0
Utah [2]	11	17	0	0	0	1	0	0	0	1	0
Nevada	0	0	0	0	0	0	0	0	0	0	0
PACIFIC											
Washington	16	55	0	0	0	0	0	0	0	0	0
Oregon	9	6	0	0	0	0	0	0	0	0	0
California	192	147	0	1	-	0	0	0	0	0	0
Total	2,455	2,530	0	13	66	17	3	0	1	28	77
51 weeks	175,244	205,011									

[1] New York City only
[2] Period ended earlier than Saturday
[3] Delayed report

WEEKLY REPORTS FROM CITIES

City reports for week ended December 12, 1942

This table lists the reports from 78 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Baltimore, Md.	1	0	5	4	3	3	12	0	24	0	0	116
Barre, Vt	0	0	-	0	20	0	0	0	0	0	0	0
Billings, Mont.	0	0	-	0	0	0	1	0	1	0	0	0
Birmingham, Ala.	1	0	8	2	0	1	4	0	2	0	0	0
Boise, Idaho	0	0	-	0	0	0	0	0	0	0	0	0
Boston, Mass	0	0	-	0	0	0	21	0	0	0	0	0
Bridgeport, Conn.	0	0	-	0	0	2	3	0	5	0	0	2
Brunswick, Ga	0	0	-	0	0	0	0	0	0	0	0	2
Buffalo, N. Y.	0	0	-	1	53	1	3	0	11	0	0	31
Camden, N. J.	1	0	-	0	2	0	2	0	3	0	0	1
Charleston, S. C.	0	0	37	1	0	0	0	0	2	0	0	0
Chicago, Ill	7	0	4	2	51	1	32	0	65	0	1	75
Cincinnati, Ohio	1	0	1	0	9	0	7	0	19	0	0	7
Cleveland, Ohio	4	0	10	1	0	1	10	1	52	0	0	84
Columbus, Ohio	1	0	2	2	0	0	4	0	21	0	0	0
Concord, N. H.	0	0	-	0	0	0	1	0	1	0	0	0
Cumberland, Md.	0	0	-	0	0	0	1	0	0	0	0	0
Dallas, Texas	1	0	-	0	0	0	2	0	4	0	1	9
Detroit, Mich.	2	0	-	4		0	13	1	27	0	0	115
Duluth, Minn.	0	0	-	0	0	0	0	0	1	0	0	1
Fall River, Mass	1	0	-	0	0	0	0	0	5	0	0	12
Fargo, N. Dak.	0	0	-	0	0	0	0	0	0	0	0	0
Flint, Mich	1	0	-	0	0	0	1	0	2	0	0	12
Fort Wayne, Ind.	0	0	-	0	0	0	4	0	0	0	0	0
Frederick, Md.	0	0	-	0	0	0	0	0	0	0	0	0
Galveston, Texas	0	0	-	0	0	0	0	0	0	0	0	0
Grand Rapids, Mich	0	0	-	0	0	0	2	0	2	0	0	5
Great Falls, Mont	0	0	-	0	3	0	1	0	4	0	0	0
Hartford, Conn.	0	0	-	2	4	0	0	0	1	0	0	4
Helena, Mont	0	0	-	0	2	0	1	0	0	0	0	0
Houston, Texas	3	0	-	0	1	0	8	0	2	0	1	0
Indianapolis, Ind.	2	0	-	0	12	0	8	1	11	0	0	9
Kenosha, Wis.	0	0	-	0	3	0	0	0	2	0	0	0
Little Rock, Ark.	0	0	6	0	0	0	3	0	0	0	0	0
Los Angeles, Calif	4	0	12	1	8	0	7	5	37	0	0	20
Lynchburg, Va.	1	0	-	0	0	0	2	0	4	0	0	0
Milwaukee, Wis.	0	0	1	1	42	0	2	0	58	0	0	27
Minneapolis, Minn	1	0	-	0	1	0	3	0	30	0	0	14
Missoula, Mont	0	0	-	0	0	0	0	0	0	0	0	0
Nashville, Tenn	0	0	-	2	0	0	5	0	0	0	0	0
Newark, N. J.	0	0	1	0	2	5	8	0	10	0	0	7
New Haven, Conn	0	0	-	0	0	0	2	0	3	0	0	4
New Orleans, La	0	0	4	3	3	0	9	0	2	0	0	1
New York, N. Y	20	0	16	4	8	8	64	0	138	0	4	80
Omaha, Nebr	1	0	-	0	0	0	4	0	2	0	0	0
Philadelphia, Pa.	4	0	3	1	464	5	29	0	48	0	0	117
Pittsburgh, Pa	0	0	2	3	2	1	13	0	8	0	0	9
Portland, Maine	0	0	-	0	0	1	2	1	3	0	0	50
Providence, R. I.	0	0	1	1	0	0	5	0	2	0	0	31
Racine, Wis.	0	0	-	0	27	0	0	0	4	0	0	1
Reading, Pa.	0	0	1	0	15	0	3	0	0	0	0	8
Richmond, Va.	1	0	-	0	1	4	4	0	3	0	0	2
Roanoke, Va.	0	0	-	0	0	0	0	0	0	0	0	0
Rochester, N. Y	0	0	-	0	2	0	4	0	4	0	0	14
Saint Joseph, Mo.	0	0	-	0	0	0	2	0	0	0	0	0
Saint Louis, Mo.	2	0	-	0	2	1	16	0	12	0	0	5

WEEKLY REPORTS FROM CITIES

City reports for week ended December 12, 1942

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
Salt Lake City, Utah	1	0		0	178	0	3	0	19	0	0	6
San Antonio, Tex	3	0	2	2	0	0	9	2	1	0	0	4
San Francisco, Calif	0	0	1	0	11	1	10	0	8	0	0	14
Savannah, Ga	0	0	11	2	0	0	2	0	0	0	0	0
Seattle, Wash	0	0		1	15	0	5	0	3	0	0	15
Shreveport, La	0	0		1	0	0	6	0	0	0	0	0
South Bend, Ind	0	0		0	0	0	0	0	1	0	0	3
Spokane, Wash	0	0		0	34	0	2	0	3	0	0	0
Springfield, Ill	0	0		1	0	0	4	0	0	0	0	24
Springfield, Mass	0	0		0	7	0	5	0	81	0	0	5
Superior, Wis	1	0		0	2	0	0	0	1	0	0	12
Syracuse, N Y	0	0		0	0	0	2	0	3	0	0	23
Takoma, Wash	0	0		0	69	0	3	0	1	0	0	4
Tampa, Fla	0	0		0	1	0	3	0	0	0	0	0
Terre Haute, Ind	0	0		1	0	0	2	0	1	0	0	0
Topeka, Kans	0	0		0	7	0	1	0	2	0	0	0
Trenton, N J	0	0	4	1	1	0	3	0	6	0	0	0
Washington, D. C	5	0	7	1	3	0	13	0	14	0	0	17
Wheeling, W Va	0	0		0	0	0	1	0	0	0	0	8
Wilmington, Del	0	0		1	0	0	1	0	0	0	0	3
Wilmington, N C	2	0		0	0	0	3	0	1	0	0	3
Worcester, Mass	0	0		0	5	0	5	0	7	0	0	10

Anthrax Cases Philadelphia, 1.
Dysentery, amebic.—Cases Baltimore, 1, Los Angeles, 1, San Francisco, 2
Dysentery, bacillary—Cases Baltimore, 2, Buffalo, 5, Charleston, S C, 10, Detroit, 2, Los Angeles, 4, New York, 2, Richmond, 2, Rochester, 2, St Louis, 1.
Leprosy —Cases New Orleans, 1.
Tularemia —Cases Cleveland, 1.
Typhus fever Cases Charleston, S C, 2, Dallas, 1, Los Angeles, 1, Nashville, 1; San Antonio, 1, Savannah, 1

Rates (annual basis) per 100,000 population for the group of 78 cities in the preceding table (estimated population, 1942, 31,?35,700)

Period	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
Week ended Dec 12, 1942	11 43	22 70	7 84	173.56	67 27	128 50	0 00	1 14	167.36
Average, 1937-41	17 14	21 75	[1] 5.25	[2] 176.67	[1] 57 43	144 04	1 15	3 63	171 56

[1] 3-year average, 1939-41.
[2] 5-year median.

PLAGUE INFECTION IN TACOMA, WASHINGTON

Under date of December 14, 1942, plague infection was reported proved in specimens of fleas and tissue from rats, *R. norvegicus*, taken in Tacoma, Washington, on December 2 and December 5 as follows: One specimen consisting of a pool of 125 fleas from 134 rats, one of

tissue from 1 rat, and two of tissue from lots of 4 and 27 rats, respectively.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—September 1942.—During the month of September 1942, certain notifiable diseases were reported in the Panama Canal Zone, and terminal cities, as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	25		7		1		2		35	
Diphtheria	17	1	3		11		4	1	35	2
Dysentery (amebic)	4		2	1	4		5		15	1
Encephalitis, lethargic		1								1
Malaria [1]	29		5		504		180	5	718	5
Measles	5				16		2		23	
Meningitis, meningococcus				1	1		1		2	1
Mumps	1				2				3	
Pneumonia		6		8	103	3		3	[2] 103	20
Relapsing fever	1								1	
Tuberculosis		14		3	10	1		7	[2] 10	25
Whooping cough				1	1				[2] 1	1

[1] Includes 193 recurrent cases
[2] Cases reported in the Canal Zone only

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended November 28, 1942.—During the week ended November 28, 1942, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		1		1	1	1				4
Chickenpox		19		277	448	77	139	29	70	1,059
Diphtheria		16	1	72	3	2	1			95
Dysentery				22			2			24
German measles				5	12		2		5	24
Influenza						5	4		16	25
Lethargic encephalitis						1				1
Measles				33	115	9	18		3	178
Mumps		26	2	66	613	46	60	43	246	1,102
Pneumonia		6			8	1			26	41
Poliomyelitis			2	1	2				2	7
Scarlet fever		3	15	132	96	16	21	36	57	376
Tuberculosis	2	11	4	123	57	24	6	33	22	282
Typhoid and paratyphoid fever				5	1					6
Undulant fever				1	2	1				4
Whooping cough		3	1	299	100	30	4	20	14	471
Other communicable diseases		1		8	228	50		1	7	295

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Indochina.—For the period November 11–20, 1942, 1 case of plague was reported in Indochina.

Smallpox

Ecuador.—*Guayaquil and vicinity.*—During the month of November 1942, 4 cases of smallpox with 1 death were reported in Guayaquil and vicinity, Ecuador.

Turkey.—During the week ended December 5, 1942, 142 cases of smallpox were reported in Turkey.

Typhus Fever

Hungary.—For the week ended November 28, 1942, 5 cases of typhus fever were reported in Hungary.

Rumania.—For the week ended November 28, 1942, 52 cases of typhus fever were reported in Rumania.

Turkey.—During the week ended December 5, 1942, 7 cases of typhus fever were reported in Turkey.

Yellow Fever

Venezuela—Bolivar State—Piar District—Municipality of Pedro Cova.—On August 13, 1942, 1 case of yellow fever occurred in the Municipality of Pedro Cova, Piar District, Bolivar State, Venezuela. The patient died on August 18, 1942. Immediate vaccinations were made among the inhabitants of the neighborhood.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements, should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 58 **JANUARY 8, 1943** NUMBER 2

IN THIS ISSUE

Industrial Health Activities by State Agencies

CONTENTS

Public Health Reports

Vol. 58 • JANUARY 8, 1943 • *No. 2*

DISTRIBUTION OF HEALTH SERVICES IN THE STRUCTURE OF STATE GOVERNMENT *

CHAPTER VIII—INDUSTRIAL HEALTH ACTIVITIES BY STATE AGENCIES

By JOSEPH W. MOUNTIN, *Assistant Surgeon General*, and EVELYN FLOOK, *United States Public Health Service*

Until rather recently, management, society-at-large, and, in fact, workers themselves accepted rather complacently the hazards of industrial employment. Development of concern for the health of employees stems, in large measure, from compensation schemes inaugurated during the early part of the present century. Since the initial, and often still the only, coverage was for accidents, it follows that major emphasis has been placed on safety. Occasionally, this interest is combined with enforcement of labor standards under the administration of labor departments. With greater frequency, insur-

*From the States Relations Division This is the eighth chapter of the third edition of Public Health Bulletin No 184 Previous chapters are

Mountin, Joseph W., and Flook, Evelyn Distribution of health services in the structure of State government—Chapter I. The composite pattern of State health services Pub Health Rep, 56 1673 (August 22, 1941) Reprint No 2306

Mountin, Joseph W, and Flook, Evelyn Distribution of health services in the structure of State government—Chapter II Communicable disease control by State agencies Pub Health Rep, 56 2233 (November 21, 1941) Reprint No. 2334

Mountin, Joseph W, and Flook, Evelyn Distribution of health services in the structure of State government—Chapter III Tuberculosis control by State agencies Pub. Health Rep, 57 65 (January 16, 1942) Reprint No 2348

Mountin, Joseph W, and Flook, Evelyn Distribution of health services in the structure of State government—Chapter IV Venereal disease control by State agencies Pub Health Rep, 57 553 (April 17, 1942) Reprint No 2369

Mountin, Joseph W, and Flook, Evelyn Distribution of health services in the structure of State government—Chapter V Sanitation by State agencies Pub Health Rep, 57 885 (June 12, 1942) and 57 917 (June 19, 1942) Reprint No 2386

Mountin, Joseph W, and Flook, Evelyn Distribution of health services in the structure of State government—Chapter VI Medical and dental care by State agencies Pub Health Rep, 57 1195 (August 14, 1942) and 57 1235 (August 21, 1942) Reprint No. 2395

Mountin, Joseph W, and Flook, Evelyn Distribution of health services in the structure of State government—Chapter VII Maternity-child health activities by State agencies Pub. Health Rep., 57: 1791 (November 27, 1942) Reprint No 2425

Succeeding chapters will be published in subsequent issues of the Public Health Reports.

ance and labor agencies work independently toward their separate objectives. As a result of the interest and research in occupational diseases by medical and health agencies, there has evolved a distinct public health category commonly referred to as industrial hygiene.

Prior to passage of the Federal Social Security Act in 1935, little progress had been made by State health departments in industrial hygiene activities. A decade ago,[1] only five departments engaged in health services for industrial workers, but, as shown by Trasko and Bloomfield,[2] within the past few years there has been a sharpening of interest in the possibilities of industrial hygiene. Availability of Federal funds through title VI of the Social Security Act for the expansion of all forms of public health endeavor has expedited translation of this interest into organized service programs. Data collected in 1940 for the purpose of preparing the current version of Public Health Bulletin No. 184 (Revised),[3] and which covers some thirty-five classes of health activity, also point to numerous other functions of official State agencies that are significant to industrial health, even though they may be associated primarily with some related field of service and do not operate under the formal designation of "industrial hygiene."

In the present article, chapter VIII of a series entitled "Distribution of Health Services in the Structure of State Government," it is proposed to describe the manner in which all agencies of State government operate for the conservation of health among persons employed in industry. As in all previous chapters, the source material covers activities pertinent to mass and individual health, whether administered by the health department or by any other State department, board, or commission Inquiry was not extended to local units of government, to voluntary health agencies, or to the industries themselves since the objective of the study was to obtain a picture of participation by State agencies in the various health services. Description of the diverse approaches to the industrial health problem is

[1] Ferrell, John A., Smillie, Wilson G., Covington, Platt W., and Mead, Pauline A., International Division of the Rockefeller Foundation for the Conference of State and Provincial Health Authorities of North America Health Departments of States and Provinces of the United States and Canada. Public Health Bulletin No. 184 (Revised). United States Government Printing Office, Washington, 1932.

[2] Trasko, V. M., and Bloomfield, J. J.: An analysis of industrial hygiene activities in State and local health departments, 1940–41 Pub. Health Rep., 57:853 (June 5, 1942).

[3] See footnote [1].

facilitated by grouping the multifarious functions of State agencies under the following headings: Regulation, promotion, education, supervision and consultation, financial aid, and direct service. No distinction is made between industrial hygiene administered as a separate entity and that which is carried on as a subsidiary issue of a related program. In other words, activity more than organization is featured, but any State agency which participates in any function directly relevant to the health of industrial workers is listed as a contributor to the complete State plan for furtherance of industrial health.

Because of the close interrelationship which exists between industrial hygiene, including safety, and workmen's compensation schemes, these two categories of activity may be regarded as the main factors of a broad plan for either preventing or lightening the individual burden of industrial injury and illness. Throughout this report industrial health measures are featured in considerable detail, while only the pertinent aspects of State compensation schemes and labor regulation programs are outlined.

AGENCIES THAT PARTICIPATE IN INDUSTRIAL HEALTH ACTIVITIES

Table 1 is constructed for the purpose of identifying, in each of the several States,[4] the units of State government that function in any way for prevention of industrial sickness and accidents and the compensation for such misfortunes which are sustained through occupation. From this tabulation it is apparent that during the survey year (1940), all States carried on some type of activity for the improvement of industrial health. To a varying degree, practically all State health departments exercise some influence for this purpose. In over one-fourth of the States, however, functions of the health department were limited to its general powers which are broad enough to include industrial health; no active programs were in operation during 1940. Thirty-eight State labor departments reported some activity directed toward the health interests of industrial employees. Industrial accident boards or commissions and departments of mines and mining also occupied relatively prominent positions in the industrial health scene, while workmen's compensation commissions of 10 States functioned in this broad field.

[4] The term "State" as used in the discussion which follows includes the States, the Territories, the District of Columbia, and the Virgin Islands.

TABLE 1.—*Official State agencies participating in industrial health activities* in each State and Territory, the District of Columbia, and the Virgin Islands***

State or Territory	Department of State government					
	Health	Labor, labor and industry, industrial relations	Industrial accident board or commission, department of industrial accidents	Workmen's compensation commission, board, or bureau	Mines and mining, bureau of mines	Other
Alabama	X	X				
Arizona	X [a]		X		X	
Arkansas	X [a]	X			X	
California	X		X [b]			
Colorado	X		X		X	
Connecticut	X	X		X		
Delaware	X [a]	X	X			
District of Columbia	X [a]					X
Florida	X [a]		X			
Georgia	X [a]	X	X [b]			
Idaho [c]	X		X		X	
Illinois	X	X	X [b]		X	
Indiana	X	X			X	
Iowa	X	X	X		X	
Kansas	X	X		X		
Kentucky	X	X		X [b]	X	
Louisiana	X [a]	X				
Maine [c]	X	X	X			
Maryland	X	X	X			
Massachusetts	X	X	X			
Michigan	X	X				
Minnesota	X	X	X			
Mississippi	X					
Missouri	X	X		X	X	
Montana	X	X	∴			
Nebraska	X [a]	X		X		
Nevada	X [a]		X		X	
New Hampshire	X	X				
New Jersey	X [a]	X				
New Mexico	X	X			X	
New York	X [a]	X				
North Carolina	X	X	X			X
North Dakota	X [a]			X	X	
Ohio	X	X	X			
Oklahoma	X	X	X		X	X
Oregon	X [a]	X	X			X
Pennsylvania	X	X			X	
Rhode Island	X	X				
South Carolina	X	X	X			
South Dakota	X [a]		X			
Tennessee	X	X				
Texas	X	X	X			
Utah	X		X			
Vermont	X		X			
Virginia	X	X	X			
Washington	X	X				
West Virginia	X	X		X	X	
Wisconsin	X		X			
Wyoming	X [a]	X		X	X	
Alaska					X	
Hawaii	X	X				
Puerto Rico	X	X		X		
Virgin Islands				X		

*Activities herein described pertain to industrial hygiene as such, to associated miscellaneous services for health and safety of industrial workers, and to the closely related workingmen's compensation activities which are administered by State agencies

**Any differences between information presented in this table and corresponding entries in table 1, chapter I, of this series are the result of combining several activities originally shown separately, or of further refinement of the data since publication of the initial article

[a] Broad powers include health aspects of industrial employment, but no specific activities for this purpose are engaged in

[b] The indicated agency is an autonomous unit within the department of industrial relations or the department of labor.

[c] The department of health is really a division (Idaho) and bureau (Maine) of public health, subordinate to the department of public welfare (Idaho) and the department of health and welfare (Maine)

It is not the practice of State governments to concentrate all health services for industrial workers within a single agency. Dual participation occurred in 17 States, triple in 24, four separate governmental units contributed to the total State effort in 8 jurisdictions, while in 1 State as many as five shared authority. Division of responsibility does not necessarily indicate duplication of services, for not all agencies listed operated either complete or balanced industrial health programs.

While table 1 is not intended to portray the manner in which each of these various agencies functions, it might be said for purposes of orientation that the labor department is concerned primarily with safety measures for the prevention of industrial accidents and with regulation of working conditions. The health department, on the other hand, focuses upon the reduction of disease incidence among industrial workers. Determining environmental factors conducive to illnesses associated with particular types of employment and recommending measures for control of these elements constitute the usual health department approach to this aspect of the total industrial health problem. Industrial commissions and workmen's compensation commissions are, on the whole, responsible for administration of workingmen's compensation laws. Departments of mines and mining, as the name implies, are especially interested in the welfare of miners. In general, the functional dispersion described herewith corresponds closely to that reported in 1938 by the Division of Labor Standards of the United States Department of Labor.[5] As stated previously, the activities of voluntary agencies and of industries are not covered by this report. It should be recognized, however, that their activities —which feature medical and nursing services—represent very important contributions to the over-all industrial health program.

THE RANGE OF STATE INDUSTRIAL HEALTH ACTIVITIES

The problems associated with industrial health are numerous and varied. Consequently, many attempts, differing widely in character, are constantly being made to solve these problems. To insure a clearer understanding of the diverse efforts for improvement of industrial health, several broad organizational categories—together with the activities most commonly ascribed to each—are listed:

Industrial hygiene.—Routine reporting and investigation of occupational diseases; determination of the extent to which certain dusts, fumes, acids, metals, solvents, or other toxic substances are present; medical examination of employees to learn the effect of environmental factors discovered; recommendation of measures to control health hazards found; and education of employers and employees regarding benefits to be derived from such recommendations.

[5] National Silicosis Conference Report on Regulatory and Administrative Phases of the Silicosis Problem. Bulletin No. 21, Part 4. United States Department of Labor, Division of Labor Standards. U. S. Government Printing Office, Washington, 1938.

Factory inspection and labor regulation.—Periodic inspection of the physical lay-out of industrial plants, with particular attention to ventilation, illumination, sanitation, and safety of mechanical devices employed; check upon hours of employment, and upon conditions under which women and children are employed; routine reporting of industrial accidents.

Employee compensation.—Arrangements for extending financial aid to persons injured or contracting certain types of illness as a result of their employment. (Payments may be made for injuries incurred, wage loss, or for medical, surgical, or hospital care required.)

In-plant medical service.—First aid; periodic physical examination; health education; and general and community medical service.

In other words, both the recognition and the solution of health problems encountered in industry require the combined knowledge and efforts of engineers, chemists, technicians, physicians, and nurses. Only the first three of the four major branches of industrial health activity will be discussed in this report since in-plant medical service is discharged almost exclusively by private industry and not by official State agencies. The same is true of complete medical service programs for workers and their families as supplied by a few corporations. For purposes of distinction, the term "industrial hygiene" as used throughout the discussion refers to programs specifically defined heretofore. Such programs usually represent health department activity. The phrase "industrial health activities" includes the three categories previously mentioned, namely, industrial hygiene, factory inspection and labor regulation, and employee compensation.

As in handling health services of other categories, discussion of the diversified methods by which State agencies operate for the improvement of industrial health is simplified by grouping the numerous activities of participating agencies under the broad functional headings termed regulation, promotion, education, supervision and/or consultation, financial aid, and direct service. In table 2 are listed, under each functional classification, specific measures which are employed by the designated agency of State government for the reduction or alleviation of industrial illnesses and accidents. Although arrangement of the major classifications of activity follows the standard pattern adopted for revision of Public Health Bulletin 184, the relative weight of the several items is not the same for all branches of public health endeavor. Consequently, in discussion, functions will not always be treated singly or in the same order in which they appear in the table. Rather, they will be related to the several broad organizational categories of industrial health activities mentioned earlier: Industrial hygiene, factory inspection and labor regulation, and employee compensation.

TABLE 2.—*Department of State government* responsible for specific industrial health activities** in each State and Territory, the District of Columbia, and the Virgin Islands*

Activity	State or Territory							
	Alabama	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia
Promulgates and/or enforces State laws, rules, and regulations pertaining to health of industrial workers	1, 2	1[b], 3, 5	1, 2, 5	1[b], 3[c]	1[b], 3, 5	1, 2, 4	1[b], 2, 3	1[b], 6
Conducts educational programs for.								
The general public (including employers and employees in industry)	1, 2	—	—	1, 3[c]	1	1	—	—
Staff members of the State agency	1	—	—	—	1	1	—	—
Supervises and/or provides consultation service to local organizations	1, 2	—	—	1	1	1	—	—
Distributes and/or administers grants-in-aid for local industrial hygiene activities	—	—	—	1	—	—	—	—
Operates a direct service program:								
Receives reports of all accidents occurring in industry	2	3	—	3[c]	3	2[e], 4	3	—
Investigates industrial accidents as to cause	2	3, 5	—	3[c]	3	2	3	—
Receives reports of occupational diseases[g]	1[h]	—	—	1, 3[c]	—	1, 4	—	—
Investigates occupational diseases reported	—	—	—	1	—	1	—	—
Makes special studies to determine the influence of occupational conditions upon the health of workers	1	—	—	1	1	1	—	—
Furnishes to industries and/or industrial physicians direct advisory service relative to elimination of health hazards and to prevention and treatment of occupational diseases	1, 2	—	—	1[d]	1, 3	1	—	—
Provides free laboratory service to industries for analysis of materials suspected as health hazards	1	—	—	1	1	1	—	—
Routinely inspects industrial plants and mercantile establishments for—								
Sanitation	2	—	2	3[c]	3	2	2[d]	—
Heat, light, and ventilation	—	—	2	3[c]	3	2	2[d]	—
Safety	2	3[i]	2	3[c]	3	2	—	—
Checks plans for construction of industrial establishments	2	—	—	—	—	2	—	—
Routinely inspects mines for safety	2	5	5	3[c]	5	—	—	—
Makes physical examinations of industrial workers	—	—	—	—	—	—	—	—
Administers a system of workingmen's compensation for—								
Industrial accidents and occupational diseases	—	—	—	3[c]	—	4	3	—
Industrial accidents only	2	3	—	—	3	—	—	—
Administers a system of workingmen's compensation that is—								
Entirely State-operated	—	—	—	—	—	—	—	—
Entirely a private enterprise	2[i]	—	—	—	—	4	3	—
A combination (State and private)	—	3	—	3[c]	3	—	—	—
Renders additional service not covered by this classification	—	—	—	3[c]	5	—	—	—

See footnotes at end of table.

Table 2.—*Department of State government responsible for specific industrial health activities,[1] in each State and Territory, the District of Columbia, and the Virgin Islands*—Continued

Activity	Florida	Georgia	Idaho[a]	Illinois	Indiana	Iowa	Kansas	Kentucky
	State or Territory							
Promulgates and/or enforces State laws, rules, and regulations pertaining to health of industrial workers	1[b], 3	1[b], 2, 3[c]	1, 3, 5	1[b], 2, 5	1, 2, 5	1, 2, 3, 5	1[b], 2, 4	1, 2, 4[e], 5
Conducts educational programs for								
The general public (including employers and employees in industry)			1	1, 2, 5[d]	1	1	1	
Staff members of the State agency			1	1, 2	1	1		
Supervises and/or provides consultation service to local organizations			1	1, 2	1, 2	1	1	
Distributes and/or administers grants-in-aid for local industrial hygiene activities								
Operates a direct service program:								
Receives reports of all accidents occurring in industry	3	3[c]	3	3[c], 5[d]	2	2, 3, 5	4	4[e]
Investigates industrial accidents as to cause	3	3[c], [d]	3	2	2	2, 5	2[d]	4[e]
Receives reports of occupational diseases[g]		1[h]	1	3[c]	2	1	1[h]	
Investigates occupational diseases reported				3[c], [d]	1[d]	1		
Makes special studies to determine the influence of occupational conditions upon the health of workers			1	1, 2	1	1	1	
Furnishes to industries and/or industrial physicians direct advisory service relative to elimination of health hazards and to prevention and treatment of occupational diseases		2[d]	1	1, 2	1	1	1, 2	
Provides free laboratory service to industries for analysis of materials suspected as health hazards			1	1, 2	1	1	1	
Routinely inspects industrial plants and mercantile establishments for—								
Sanitation		2	1[i]	2	2	1	2	
Heat, light, and ventilation		2	1[i]	2	2	1	2	
Safety		2	1[i]	2	2	2	2	2
Checks plans for construction of industrial establishments				2[j]	2			2
Routinely inspects mines for safety		2	5	5	5	5	2	5
Makes physical examinations of industrial workers			1[d]	1[d], 2[d]	1[d]			
Administers a system of workingmen's compensation for—								
Industrial accidents and occupational diseases			3	3[c]	2			4[e], [k]
Industrial accidents only	3	3[c]				3	4	
Administers a system of workingmen's compensation that is—								
Entirely State-operated								
Entirely a private enterprise	3	3[c]		3[c]	2	3	4	4[e]
A combination (State and private)			3					
Renders additional service not covered by this classification				1, 3[c]				

See footnotes at end of table.

Table 2.—*Department of State government responsible for specific industrial health activities in each State and Territory, the District of Columbia, and the Virgin Islands*—Continued

Activity	State or Territory							
	Louisiana	Maine [a]	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri
Promulgates and/or enforces State laws, rules, and regulations pertaining to health of industrial workers	1[h], 2	1, 2, 3	1, 2, 3	1[b], 2, 3	1, 2	1, 2, 3	1	1, 2, 4, 5
Conducts educational programs for—								
The general public (including employers and employees in industry)	----	-	-----	2	1, 2	1	-----	1
Staff members of the State agency	----	--	---	2	1	1	-----	1
Supervises and/or provides consultation service to local organizations	-----	-	-	2	1	1	-----	1
Distributes and/or administers grants-in-aid for local industrial hygiene activities	-- --	---	---	------	1	-----	-----	1
Operates a direct service program								
Receives reports of all accidents occurring in industry	- ----	2[d], 3	3	3	2	3	-----	4[d]
Investigates industrial accidents as to cause	------	-	3[d]	2	2	2	------	2, 4
Receives reports of occupational diseases [a]	-----	1[h]	1, 3	2	1	1	-----	1[h], 4[d]
Investigates occupational diseases reported	--	1[h]		2	1	1	-----	4[d]
Makes special studies to determine the influence of occupational conditions upon the health of workers	--	-	---	2	1	1	------	1
Furnishes to industries and/or industrial physicians direct advisory service relative to elimination of health hazards and to prevention and treatment of occupational diseases	--	-- -	2	1, 2	1, 2	1	----	1
Provides free laboratory service to industries for analysis of materials suspected as health hazards	----	-	-	2	1	1	-----	1
Routinely inspects industrial plants and mercantile establishments for—								
Sanitation	2[d]	2	2	2	2	2	1	2
Heat, light, and ventilation	2[d]	2	2	2	2	2	-----	2
Safety	2[d]	2	2	2	2	2	1	2
Checks plans for construction of industrial establishments	------	1, 2	-----	2	1[d]	2[d]	------	-- ----
Routinely inspects mines for safety	----	------	2	----	2	2	------	5
Makes physical examinations of industrial workers	------	-----	-----	---	----	------	1	------
Administers a system of workingmen's compensation for—								
Industrial accidents and occupational diseases	-- ---	--- -	3	3	2	3	------	4
Industrial accidents only	-----	2, 3	- --	-- ----	--	------	------	-------
Administers a system of workingmen's compensation that is—								
Entirely State-operated	------	-	------	----	----	------	------	-------
Entirely a private enterprise	------	2, 3	------	3	--- -	3	------	4
A combination (State and private)	------	- --	3	------	2	------	------	------
Renders additional service not covered by this classification	------	-----	------	-------	1, 2	------	1	-------

See footnotes at end of table.

TABLE 2.—*Department of State government responsible for specific industrial health activities in each State and Territory, the District of Columbia, and the Virgin Islands*—Continued

Activity	State or Territory							
	Montana	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina
Promulgates and/or enforces State laws, rules, and regulations pertaining to health of industrial workers	1, 2, 3	1[b], 2, 4	1[b], 3, 5	1, 2	1[b], 2	1, 2, 5	1[b], 2	1, 2, 3
Conducts educational programs for:								
The general public (including employers and employees in industry)	1	------	------	1	2[d]	------	2	1
Staff members of the State agency	1	------	------	1	------	------	2	1
Supervises and/or provides consultation service to local organizations	1	------	------	1	------	------	2	1
Distributes and/or administers grants-in-aid for local industrial hygiene activities	------	------	------	------	------	------	------	------
Operates a direct service program.								
Receives reports of all accidents occurring in industry	3	4	3	2	2	2	2	3
Investigates industrial accidents as to cause	------	2	3	2	2	5[d]	2	2, 3, 6[d]
Receives reports of occupational diseases [a]	1[i]	4[h]	------	1	2	1[d]	2	3[d]
Investigates occupational diseases reported	1[i]	2[h]	------	1	2	------	2	3[d]
Makes special studies to determine the influence of occupational conditions upon the health of workers	1	------	------	1	------	------	2	1
Furnishes to industries and/or industrial physicians direct advisory service relative to elimination of health hazards and to prevention and treatment of occupational diseases	1	------	------	1	------	------	2	1
Provides free laboratory service to industries for analysis of materials suspected as health hazards	1	------	------	1	------	------	2	1
Routinely inspects industrial plants and mercantile establishments for—								
Sanitation	1	2	------	2	2	2[i]	2	2
Heat, light, and ventilation	1	2	------	------	2	2[i]	2	2
Safety	3	2	3	2	2	2[i]	2	2
Checks plans for construction of industrial establishments	------	------	------	------	2	------	2	1[d], 2[d]
Routinely inspects mines for safety	3	------	5	------	2	5	2	2
Makes physical examinations of industrial workers	------	------	------	------	2[d]	------	2[d]	1
Administers a system of workingmen's compensation for—								
Industrial accidents and occupational diseases	------	------	------	------	2	------	2	3
Industrial accidents only	3	4	3	2	------	2	------	------
Administers a system of workingmen's compensation that is—								
Entirely State-operated	------	------	3	------	------	------	------	------
Entirely a private enterprise	------	4	------	2	2	2	------	3
A combination (State and private)	3	------	------	------	------	------	2	------
Renders additional service not covered by this classification	3	------	------	------	------	5	2	1

See footnotes at end of table

Table 2.—*Department of State government responsible for specific industrial health activities in each State and Territory, the District of Columbia, and the Virgin Islands*—Continued

Activity	State or Territory							
	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota
Promulgates and/or enforces State laws, rules, and regulations pertaining to health of industrial workers	1[b], 4, 5	1, 2, 3	1[b], 2, 3, 5, 6	1[b], 2, 3, 6	1[b], 2, 5	1, 2	1, 2, 3	1[b], 3
Conducts educational programs for:								
The general public (including employers and employees in industry)	---	1, 2, 3	1[d]	------	1, 2	1	1	------
Staff members of the State agency	---	3	1	-----	1	1	1	------
Supervises and/or provides consultation service to local organizations	-----	1	1	------	1	1	1	------
Distributes and/or administers grants-in-aid for local industrial hygiene activities	---	------	--------	----	------	-----	------	----
Operates a direct service program.								
Receives reports of all accidents occurring in industry	4	3	3	3	2	2	3[d]	3
Investigates industrial accidents as to cause	4[d]	3	2	3	2, 5[d]	2[f]	3	3[d]
Receives reports of occupational diseases[e]	4	1, 3	--------	1[h]	2	1	1	-----
Investigates occupational diseases reported	4[d]	1, 3	--------	------	1[d], 2	------	1	-----
Makes special studies to determine the influence of occupational conditions upon the health of workers	------	1, 3	1	-----	1, 2	1	1	------
Furnishes to industries and/or industrial physicians direct advisory service relative to elimination of health hazards and to prevention and treatment of occupational diseases	--	1, 2	1	-----	1, 2	1	1	------
Provides free laboratory service to industries for analysis of materials suspected as health hazards	-----	1	1	----	1, 2	1	1	-----
Routinely inspects industrial plants and mercantile establishments for—								
Sanitation	4[i]	2	2	2	2	2	2, 3	------
Heat, light, and ventilation	4[i]	2	2	2	2	2	2, 3	------
Safety	4[i]	2	2	2	2	2	2, 3	------
Checks plans for construction of industrial establishments	-------	2	2	------	1, 2	-----	------	------
Routinely inspects mines for safety	5	2	5	------	5	2[d]	------	5
Makes physical examinations of industrial workers	------	1[d], 3[d]	--------	--	1[d]	1[d]	1	------
Administers a system of workingmen's compensation for—								
Industrial accidents and occupational diseases	4	3	-------	-----	2	2	3	------
Industrial accidents only	-------	-------	3	3	------	------	------	3
Administers a system of workingmen's compensation that is—								
Entirely State-operated	4	3	-------	3	------	------	------	------
Entirely a private enterprise	-------	-------	-------	------	------	2	3	3
A combination (State and private)	-------	-------	3	------	2	------	------	-----
Renders additional service not covered by this classification	5	2	5	------	------	------	-----	------

See footnotes at end of table.

Table 2.—*Department of State government responsible for specific industrial health activities in each State and Territory, the District of Columbia, and the Virgin Islands*—Continued

Activity	State or Territory							
	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin
Promulgates and/or enforces State laws, rules, and regulations pertaining to health of industrial workers	1, 2	1, 2, 3	1, 3	1, 3	1, 2, 3	1, 2	1, 2, 4, 5	1, 3
Conducts educational programs for								
The general public (including employers and employees in industry)	----	1	1	1	1	-- --	1	1, 3
Staff members of the State agency	- -	1	1	1	-	----	1	------
Supervises and/or provides consultation service to local organizations	1[d]	1	1	1	1	2	1	1
Distributes and/or administers grants-in-aid for local industrial hygiene activities	-	--	-		---	------	-------	------
Operates a direct service program								
Receives reports of all accidents occurring in industry	2	3	3	3	2	2	4	3
Investigates industrial accidents as to cause	2	3[d]	3	3	2	2	2	3[d]
Receives reports of occupational diseases [e]	----	- - -	-- -	--	----	1, 2	4[d]	3
Investigates occupational diseases reported	---- -	-------	-------		---	2	1	1
Makes special studies to determine the influence of occupational conditions upon the health of workers	- --	1	1	1	1	--	1	1
Furnishes to industries and/or industrial physicians direct advisory service relative to elimination of health hazards and to prevention and treatment of occupational diseases	-----	1	1	1	1	- - -	1	1
Provides free laboratory service to industries for analysis of materials suspected as health hazards	-----	1	1	1	1	2	1	1
Routinely inspects industrial plants and mercantile establishments for—								
Sanitation	2[d]	2	3	1	2	2	1[d], 2	3
Heat, light, and ventilation	2[d]	2	3	1		2	2	3
Safety	2[d]	2	3	3	2	2	2	3
Checks plans for construction of industrial establishments	1[d]	-- -	-	1	----	2	---- -	3
Routinely inspects mines for safety	2	2[n]	3	--	2	2	5	3
Makes physical examinations of industrial workers	------	- -	1[d]	1	1[d]	----	1[d]	1
Administers a system of workingmen's compensation for—								
Industrial accidents and occupational diseases		----	-	-----	- --	2	4	3
Industrial accidents only	2	3	3	3	3	------	--------	------
Administers a system of workingmen's compensation that is—								
Entirely State-operated	----	-------	----	-----	-------	2	4	------
Entirely a private enterprise	2	3	-----	3	-----	-----	-------	3
A combination (State and private)	------	-------	3	------	3	------	--------	------
Renders additional service not covered by this classification	------	-------	1	- -- -	-------	------	--------	------

See footnotes at end of table.

TABLE 2.—*Department of State government responsible for specific industrial health activities in each State and Territory, the District of Columbia, and the Virgin Islands*—Continued

Activity	State or Territory				
	Wyoming	Alaska	Hawaii	Puerto Rico	Virgin Islands
Promulgates and/or enforces State laws, rules, and regulations pertaining to health of industrial workers	1[b], 2, 4, 5	5	1, 2	1, 2, 4	4
Conducts educational programs for:					
The general public (including employers and employees in industry)			1		
Staff members of the State agency			1		
Supervises and/or provides consultation service to local organizations	2		1		
Distributes and/or administers grants-in-aid for local industrial hygiene activities					
Operates a direct service program:					
Receives reports of all accidents occurring in industry	4		2	4	4
Investigates industrial accidents as to cause			2	2	4
Receives reports of occupational diseases [g]			1[d], 2	1[h], 4[d]	
Investigates occupational diseases reported			1[d], 2[d]		
Makes special studies to determine the influence of occupational conditions upon the health of workers			1		
Furnishes to industries and/or industrial physicians direct advisory service relative to elimination of health hazards and to prevention and treatment of occupational diseases			1		
Provides free laboratory service to industries for analysis of materials suspected as health hazards			1		
Routinely inspects industrial plants and mercantile establishments for—					
Sanitation			1	1	
Heat, light, and ventilation			1	1	
Safety	2		1, 2	1	
Checks plans for construction of industrial establishments					
Routinely inspects mines for safety	5	5			
Makes physical examinations of industrial workers					
Administers a system of workingmen's compensation for—					
Industrial accidents and occupational diseases			2	4	
Industrial accidents only	4				4
Administers a system of workingmen's compensation that is—					
Entirely State-operated	4			4	
Entirely a private enterprise			2		4
A combination (State and private)					
Renders additional service not covered by this classification					

*Code.

1. Health department
2. Department of labor, labor and industry, labor and factory inspection, labor statistics and law enforcement, labor and statistics, or industrial relations
3. Industrial board or commission, industrial accident board or commission, department of industrial accidents, or commissioner of industries
4. Workmen's compensation board or commission or State compensation commission
5. Department of mines and mining, bureau of mines, department of mines and minerals, State mine inspector, or State mining board
6. Other departments of State government.

**Activities herein described pertain to industrial hygiene as such, to factory and mine inspection, to certain aspects of labor regulation, and to the closely related workingmen's compensation activities which are administered by State agencies

[a] The department of health is really a division (Idaho) and bureau (Maine) of public health, subordinate to the department of public welfare (Idaho) and the department of health and welfare (Maine).

[b] Broad powers include health aspects of industrial employment, but no specific activities for this purpose are undertaken.

[c] The indicated agency functions as an autonomous unit within the department of industrial relations or the department of labor.

[d] Under special conditions only: Upon request or complaint, for certain hazards, for special types of services, to special groups, for special studies.

[e] Duplicate copy referred by workmen's compensation commission.

[f] By analyzing reports, not by visits.

[g] No distinction is made between States which receive occupational disease reports by virtue of law, of regulation, or of voluntary arrangement.

[h] Has responsibility, but little is done.

[i] Program in beginning stage.

[j] Suggestions made, but compliance entirely voluntary.

[k] Industrial accidents and certain diseases specifically agreed upon by the employer and employee prior to coming under workmen's compensation.

[l] Voluntary system.

Industrial hygiene.—Studying the causes of illnesses among workers and recommending measures for their control form the basic elements of official industrial hygiene programs. The initial step in such programs is the requirement of central reporting of occupational diseases. About three-fifths of the States indicated some arrangement for the reporting of occupational diseases. Sometimes such reporting is required by law, sometimes by regulation, and sometimes by voluntary agreement. Almost always returns admittedly are incomplete; actually for the country as a whole only a very small fraction of the occupational disease occurrence is reported routinely to a central State agency. In several States, reporting is restricted to cases involving compensation; another requires reporting of silicosis only; and in several more where reporting presumably is required, no illnesses of an occupational nature had been reported during a 12-month period.

Practices differ with regard to the agency charged with collecting such reports. Either the health department, department of labor, industrial accident commission, or workmen's compensation commission may function as the receiving agency. However, the fact that the health department appears to have assumed leadership in this respect indicates that routine reporting of occupational illnesses is regarded as a significant factor in the organization of a State industrial hygiene service. In two-thirds of the States where occupational diseases officially are reported, the health department—either singly or in combination with one of the other agencies listed—is the governmental unit to which such reports are rendered. Since nearly 75 percent of the States receiving reports indicated that epidemiological studies are made of some of the diseases reported, it is evident that reports pertaining to occupational illnesses furnish leads for investigation of the causes of such disabilities. Unfortunately, the size of staff rarely permits follow-up of all reports.

Special plant investigations, made for the purpose of determining the presence and influence of various occupational conditions upon the health of workers, are a paramount feature of formally organized industrial hygiene units. Both laboratory analysis of materials suspected as being health hazards and engineering determinations of the concentration of such substances are made. State personnel do not rely wholly upon reports of occupational illnesses for initiation of industrial health investigations, however. Many are made in response to requests from plant owners or managers. The third, and largest, group originates within the official State industrial hygiene unit and serves an effective promotional and educational purpose. Investigations of the last classification are apt to be of a survey nature and cover numerous establishments of similar type, thus permitting comparative evaluations. Twenty-seven State health departments, four departments of labor, and one industrial commission engage in

special studies designed to determine and, ultimately, to reduce occupational health hazards, or to relieve various types of conditions detrimental to health or efficiency.

The more common categories of occupational illnesses are respiratory affections, conjunctivitis, dermatoses, and systemic poisonings. These are known to occur with greater frequency in some industries than in others. Consequently, it is among such establishments that State industrial hygiene units conduct quantitative and qualitative studies with reference to the presence and concentration of poisonous dusts, gases, metals, solvents, acids, and other toxic materials which are contributive to particular types of illness or other physical ailments among workers. Moreover, in plant surveys made by State industrial hygiene units, consideration is given also to illumination, temperature, humidity, excessive noise, ventilation, overcrowding, sanitary facilities, accommodations for bathing and change of clothes, safety devices, and orderliness of workrooms. Consideration of such items as part of a special survey or study is not to be confused with routine factory inspection which will be discussed later in the report.

In order that accurate findings might be assured, use of certain standardized engineering and laboratory equipment is essential for portions of each investigation. According to individual needs and resources, apparatus designed for purposes of making chemical and engineering determinations of environmental factors relative to health has been purchased by State agencies for carrying on studies of occupational health hazards. Some of this equipment is stationary, and some is portable in character.

Physical examination (including appropriate X-ray and laboratory tests) of the workers is sometimes one factor of the complete study of a plant; however, less than one-third of the States reported the inclusion of physical examination of industrial workers as an element in their broad plan of industrial health study. This service is more likely to be rendered by the employer, perhaps with some assistance or supervision from the State health agency.

After a particular set of findings is revealed as a result of plant investigations such as those described, recommendations are made by the State personnel to plant operators for improvement of ventilating and exhaust systems, reduction of humidity or dampness, installation of safety devices, or, in brief, elimination of any health hazard found. Insofar as is feasible, follow-up visits are made to determine the degree to which industries comply with the recommendations made. Owing to limited personnel, however, follow-up service is less extensive than is desirable.

Attention is now focused upon one of the most important functions of State industrial hygiene units, namely, that of providing advisory

499124°—43——3

and consultative aid. Occasionally, when sufficient data are available, reports of findings from aforementioned surveys are distributed among similar industrial establishments in order that all of them might benefit thereby. In addition to offering engineering advice regarding elimination of environmental health hazards, members of the State staff serve as consultants to industrial physicians and nurses with respect to treatment of occupational diseases.

Closely allied with a State's advisory function, yet broader in scope, are its educational activities. Whereas advice usually is given to solve a problem already recognized, educational measures are designed to help employers and employees anticipate and forestall such problems before they occur or to awaken interest in hazards hitherto unnoted. Educational methods employed are of two distinct types, one for reaching the general public (including both industrial and labor groups) and one for training professional personnel engaged in industrial health work. Among the more usual forms of popular education are distribution of literature; radio talks; lectures to labor unions, groups of industrialists, service clubs, and safety clubs; preparation of articles for technical and trade journals; and exhibits. Intramural postgraduate courses, symposiums, staff conferences, laboratory demonstrations, in-service apprenticeship t , experienced personnel, factory inspection schools, lectures to medical societies, and publication of articles in medical journals constitute the educational measures arranged for professional personnel—primarily physicians, chemists, engineers, and nurses. In the physicians' groups, efforts are made to reach general practitioners who may do industrial work on a part-time basis as well as physicians specializing in industrial medicine; besides, any practicing physician may, in the course of his rounds, find illnesses traceable to peculiar occupational hazards. As a result of the educational activities of State agencies, there is an increasingly keen realization among labor, industry, specialists in industrial health, and the public-at-large of potential health hazards associated with particular manufacturing processes or other industrial pursuits. Likewise, there is better understanding of the services available through the State industrial hygiene unit and a correspondingly greater desire to take advantage of the services offered.

Administration of official industrial hygiene services is apt to be direct in character. That is, transactions of the State agency customarily are made directly with the industry scheduled for routine inspection or requesting assistance with some specific problem. At the same time, when requested to do so, the State staff is accustomed to providing consultation service to local authorities who, in turn, maintain close contact with the industries in their several jurisdictions. For particular problems, 28 State health departments and 7

departments of labor reported offering consultatory aid to local officials.

The fact that only 3 States distribute grants-in-aid (funds or personnel) for the partial support of industrial health activities at the local level further emphasizes the point that State agencies are prone to work directly with the industries involved.

Factory inspection and labor regulation.—That industrial health activities carried on by State agencies are not limited to the technical activities of official industrial hygiene units is manifest from the fact that all States have enacted legislation for the limitation of employment insofar as women and children are concerned. Maximum daily and weekly hours of labor permitted, provision for rest periods, and prohibition of night work are a few of the employment regulations significant to the health of employees. Further discussion of such control is included in chapter VII.[6] Other regulatory measures affecting industrial health apply chiefly to assignment of power of inspection and to reporting requirements regarding industrial accidents and occupational diseases.

In the main, power of entry for inspectional purposes is delegated to the department of labor or industrial commission, since this is the situation which exists in nearly three-fourths of the States. Provisions for the safety of workers (including structural details of the work rooms, mechanical devices employed, stairways, and fire escapes) appear to receive foremost consideration in inspections made by departments of labor and industrial commissions. In the 39 States where inspection of industrial establishments is the full responsibility of such agencies, notation of provisions for safety is reported by all but 1. General sanitation ranks second, appearing on the inspection schedules of all but 4 States of the group, while 7 of them made no mention of checking miscellaneous environmental conditions such as heat, light, and ventilation.

In only 8 jurisdictions is the health department charged with any routine inspectional responsibility, and in all but 3 of these such responsibility is shared with another agency. When division of authority occurs, it is usually on a basis of particular items to be observed, sanitation being the most frequent concern of the health department. The more prominent aspects of industrial sanitation are drinking water supplies, methods of disposing of industrial wastes and sewage, toilet accommodations, and hand-washing facilities. Nine State health departments which have no inspectional authority still exert regulatory control by virtue of establishing the standards of sanitation which are enforced by the labor department or industrial commission.

It should be emphasized at this point that routine factory inspections differ markedly from plant investigations or special studies in

[6] See text footnote*

two respects. First, procedures followed in making a detailed study of the health hazards associated with an industrial plant are far more technical, thorough, and time-consuming than those employed for making inspections. Second, inspectional activity is a means of exercising regulatory authority over selected aspects of industrial operations, while special investigations are made entirely with the consent, if not upon the request, of the plant involved.

Through approval of construction plans for new or remodeled industrial establishments, many violations of industrial health standards can be avoided. Personnel of the labor department or industrial commission check building plans prior to construction in 13 States; in 3, the health department performs this service; and in 3, the two agencies collaborate. Five of the States listed do not require approval of plans regularly, but the service is afforded on a request basis or under other special circumstances.

In 37 States, mines as well as manufacturing and mercantile establishments are inspected periodically by State personnel. Fifteen departments of labor, 4 industrial commissions, and 18 special departments of mines and mining are responsible for such inspections. Occasionally, the health department supplements the mining inspectional service of the agency officially responsible.

Routine reporting of occupational accidents is required more commonly than reporting of industrial morbidity. All but 5 of the States either by law or regulation require that some unit of government shall be notified of accidents occurring in the pursuit of industrial employment. True, a few of these States limit their reporting requirements to accidents which involve compensation, while others require reports only of those resulting in a specified period of disability, which varies from State to State. Collection of reports is a function of the industrial accident commission in 22 States, the department of labor in 13, and the workmen's compensation commission in 9. In the 4 remaining jurisdictions which require reporting of industrial accidents, miscellaneous practices are followed.

That these reports serve a real purpose as control devices is indicated by the fact that all but 3 States which receive reports use them as a basis for investigating the causes of industrial accidents. Rarely are investigations made of all accidents reported, of course; selectivity is influenced by type, frequency of occurrence, seriousness, or fatality. For the most part, investigations are made by the same agency that receives the reports. Occasionally, however, the industrial commission and workmen's compensation commission refer their reports to the department of labor for investigation. In a few other States reports of mining accidents are referred to the department of mines and mining for determination of the cause.

Employee compensation.—As previously indicated, the industrial

health movement, for the most part, had its origin in compensation schemes devised for the purpose of spreading, over affected groups and over an extended period of time, the financial burden of industrial accidents. Consequently, it is appropriate that some consideration be given to the health aspects of these organized arrangements for compensating industrial employees for injuries suffered, wage loss, and expenses incurred for medical, surgical, or hospital care. Workmen's compensation systems are usually administered independently of other types of industrial health activities, although the several programs are closely related in interest. Whereas in the early plans only accidents were compensable, a number of States more recently have extended their provisions to include compensation for selected occupational illnesses as well.

In 1940, some sort of official program of workmen's compensation operated in all but 4 jurisdictions. However, the District of Columbia system is administered by a Federal and not a State agency; therefore, it is not included in the present discussion. Arkansas, Louisiana, Mississippi, and Alaska reported no State-administered scheme of employee compensation. In 23 of the jurisdictions, compensation covers industrial accidents only. In the remaining 25, selected occupational illnesses as well as accidents are compensable. There is a tendency to restrict the list of compensable illnesses to toxicological conditions. Silicosis and other selected respiratory conditions are also recognized by some States as compensable disabilities arising out of employment. Even in the States which do not have arrangements for compensation of industrial illnesses as such, opinions and decisions frequently have been given awarding payment for conditions termed illness as a result of accidental injury and latent disease aggravated by accident. Thus it appears that, indirectly, occupational disease is recognized as a legitimately compensable disability more commonly than is indicated by the number of States which specifically encompass selected diseases in their compensation laws.

Industrial commissions or industrial accident boards are charged with administration of workmen's compensation activities in half of the States. In the other half, responsibility is divided between workmen's compensation commissions and labor departments. Workmen's compensation schemes operate according to statutory terms and vary markedly as to the amount of official control that is imposed.

In addition to approving settlements, adjudicating disagreements, and, in some instances, awarding benefits, a few States have developed uniform plans for providing medical and hospital service to injured employees. Outstanding in this respect is the Ohio program. Here the industrial commission has a medical division to which is attached a staff of physicians who act as consultants to private practitioners, examine cases when indicated, and review all cases of

industrial accidents and diseases reported. Verification of the degree of disability (including inspection of all X-ray plates submitted) and approval of all medical bills must be given by the commission before payment is made. The medical division contracts with individual hospitals to supply care for injured employees at a specified per diem rate. The patient is free to select his physician, but fee schedules are established for the various types of medical service and for braces and other appliances. While few medical programs associated with State workmen's compensation activities are so highly organized as this, most of them do include uniform benefit schedules.

Of particular interest is the observation that, unless all transactions are completed by the State agency, few jurisdictions have full records either of the volume and kind of cases compensated or of disbursements for payment of claims. This situation arises from variations in payment procedures. For instance, in some States only contested cases of private insurance companies come to the attention of the State agency; moreover, agreements reached under self-insurance systems are rarely reported to the State. Actually, the amount of money spent for medical, surgical, or hospital care is an item of particular significance to this study, but segregation of awards for these particular purposes freq· ·ntly was not made in State accounts.

A brief summary of the data presented leads to the following disclosures. In 1940, practically all States were carrying on some type of activity for the improvement of industrial health, though scarcely more than two-thirds of them operated industrial hygiene programs formally organized as such. State responsibility for better health among industrial workers is distributed among health departments, labor departments, and industrial boards or commissions. Workmen's compensation commissions also function in a closely related capacity. Reduction of industrial accidents and prevention of occupational illnesses are the two objectives upon which State endeavors hinge. Law enforcement is the oldest tool to be used for these purposes. Labor departments and industrial commissions are usually supported in their efforts by having specific regulatory authority for correction of certain conditions detrimental to the health of those employed in industry, while all State health departments have broad powers which permit intervention in industrial establishments if health conditions warrant such action. In addition to regulatory control, educational activities and advisory aid represent major features of industrial hygiene programs administered by State health departments. Recommendations by State personnel for elimination of occupational health hazards are based upon findings gleaned partially from routine factory inspection and disease reports, but more particularly from special investigation of plants in which reported accidents

and illnesses occur. Such investigations involve study of precautions taken for safety and detailed laboratory and engineering determinations of the presence and concentration of dusts, fumes, vapors, and poisonous substances to which workers are exposed. A few labor departments and industrial commissions offer educational and advisory service, likewise.

EXPENDITURES FOR INDUSTRIAL HEALTH SERVICES

Translation of State health services to industry into terms of the cost of such services provides the best available index to the relative efforts of the several States toward lightening the burden of industrial accidents and occupational illnesses. However, in this as in other health fields, it is not possible to isolate and assess all public services that contribute to the health of industrial employees since they are residents of the community and participate in such general health measures as the community affords. In table 3 are recorded gross and per capita expenditures of each State for industrial hygiene activities as such, plus related industrial health functions which largely consist of factory inspection for safety and sanitation and of regulation of employment conditions for women and children. Gross expenditures have then been shown in relation to the labor force [7] of each State. Insurance benefits and the cash value of medical services attached to compensation schemes have been omitted from this table for reasons that are discussed later.

Insofar as could be determined, aggregate expenditures by the country as a whole for State industrial health services falling within the classifications mentioned (industrial hygiene programs organized as such, plus miscellaneous activities affecting the health of industrial workers—such as inspection of factories for sanitation and safety, inspection of mines, regulation of working conditions for women and children, and the like) exceed 4½ million dollars. In nearly a dozen States, however, accounting practices of the agency concerned did not permit segregation of expenditures for purposes pertaining to this discussion. Since the States which failed to supply expenditure data represent about 8 percent of the total labor force of the United States, it is roughly estimated that the complete expenditure figure would be in the neighborhood of 5 million dollars. However, all analysis of fiscal information will be based upon the $4,681,000 actually reported. Of this amount, less than 10 percent is charged to industrial hygiene programs of State health departments. Thus it is demonstrated clearly that although there has been remarkable growth in formally organized industrial hygiene units of State health departments during recent years, the financial support given technical services designated

[7] Employment Status of Persons 14 Years Old and Over. Series P-8, Sixteenth Census of the United States—1940. United States Department of Commerce, Bureau of the Census

TABLE 3.—*Approximate total annual expenditures* and expenditures per member of the labor force** by all official State agencies for industrial health services*** in each State and Territory, the District of Columbia, and the Virgin Islands*

State or Territory	Approximate total annual expenditure* for industrial health services***	Labor force in 1940**	Approximate annual expenditure* per member of the labor force** for industrial health services***
Total	$4,681,000	52,789,499	(a) $0 096
Alabama	33,900	1,017,188	.033
Arizona	18,800	180,247	.104
Arkansas	(b)	678,859	(b)
California	306,500	2,948,427	.104
Colorado	43,500	421,493	103
Connecticut	95,900	770,003	.125
Delaware	(b)	114,260	(b)
District of Columbia	(b)	344,033	(b)
Florida	(b)	786,804	(b)
Georgia	23,500	1,225,705	019
Idaho	16,800	191,196	087
Illinois	495,000	3,360,823	.147
Indiana	47,200	1,331,378	035
Iowa	32,700	957,869	.034
Kansas	26,200	669,815	039
Kentucky	(b)	998,700	(b)
Louisiana	5,200	884,164	.006
Maine	(b)	330,421	(b)
Maryland	31,500	767,091	041
Massachusetts	192,500	1,844,260	.104
Michigan	66,300	2,125,877	.031
Minnesota	43,900	1,101,464	040
Mississippi	4,000	808,462	.005
Missouri	57,800	1,521,086	.038
Montana	24,600	224,994	.109
Nebraska	15,000	501,013	.030
Nevada	15,000	47,979	313
New Hampshire	17,900	206,919	.087
New Jersey	97,400	1,857,340	.052
New Mexico	4,900	177,908	028
New York	917,100	5,962,199	.154
North Carolina	23,500	1,333,773	.018
North Dakota	4,100	235,661	.017
Ohio	432,800	2,765,687	.156
Oklahoma	28,900	804,582	.036
Oregon	35,000	453,382	.077
Pennsylvania	907,100	3,986,000	.228
Rhode Island	36,900	321,644	.115
South Carolina	10,200	730,780	.014
South Dakota	(b)	239,826	(b)
Tennessee	8,500	1,071,904	.008
Texas	22,100	2,454,924	.009
Utah	38,700	181,244	.214
Vermont	10,100	141,407	.071
Virginia	38,000	1,031,289	.037
Washington	(b)	716,501	(b)
West Virginia	306,200	634,957	.482
Wisconsin	125,000	1,227,552	102
Wyoming	21,300	100,409	.212
Alaska	(b)	(c)	(b)
Hawaii	(b)	(c)	(b)
Puerto Rico	(b)	(c)	(b)
Virgin Islands	(b)	(c)	(b)

* Expenditures for the health services considered represent index rather than absolute amounts. Because of variations in fiscal periods, figures cover the most recent year for which information was available at the date of interview. In some instances, because of overlapping and interweaving of activities, estimates were accepted in the absence of precise expenditure records.

** Labor force includes all employed persons 14 years of age or over plus those engaged in public emergency work and those seeking employment.

*** Insofar as they could be separated, figures for industrial health services cover industrial hygiene programs organized as such, plus miscellaneous activities affecting the health of industrial workers—such as inspection of factories for sanitation and safety, inspection of mines, regulation of working conditions of women and children, and the like.

(a) This figure represents the average expenditure per worker in the 41 States which supplied cost data. It is based upon the labor force of these 41 States which totals 48,580,095 persons, or 92 percent of the labor force of the entire United States.

(b) Information not available for industrial health activities as such

(c) Information not available.

as such nowhere approaches that accredited to other governmental units for functions characterized chiefly as factory inspection for safety and sanitation and regulation of employment conditions significant to health. Moreover, if an absolutely complete expenditure record were attainable, the difference between the two categories of service probably would be more pronounced than is here indicated, since expenditures for miscellaneous industrial health services are more apt to be interwoven with activities beyond the scope of this study than are those for industrial hygiene programs administered as separate entities. It will be recalled, of course, that 4 departments of labor and 1 industrial commission afford technical services of much the same nature as those offered by industrial hygiene units of State health departments.

From the standpoint of individual States supplying cost data, expenditures ranged from $4,000 in Mississippi to over $900,000 in New York and Pennsylvania. When totals are converted to cost per worker,[8] however, Tennessee, Texas, and Louisiana, as well as Mississippi, occupy low positions, each having an expenditure of less than one cent per person employed or seeking employment. Largely because of its outlay for mine inspection, which represents 80 percent of the total in this State, West Virginia ranks highest, with a corresponding expenditure of 48 cents. To a large extent, differences among the States in expenditures for industrial health services are determined by the State's ability to purchase service. This association is manifest from arraying the States according to wealth (as measured by per capita income [9]), dividing them into quarters, and computing for each quarter the median annual expenditure per worker for industrial health services. Medians so determined are as follows: Highest quarter, $0.136; second quarter, $0.077; third quarter, $0.038; and lowest quarter, $0.018. Thus it is seen that the State occupying the median position in the wealthiest quarter spends seven and one-half times as much per member of the labor force as does the State holding a corresponding place in the poorest quarter.

Exploration of geographic [10] influence upon disbursements of State agencies for improvement of industrial health points to appreciably greater outlays in the Northeastern and Western groups of States than in either the Southern or Central portion of the country. At the

[8] Employed persons 14 years of age or over plus those engaged in public emergency work and those seeking employment.

[9] Martin, John L., National Income Division, Department of Commerce: Income Payments to Individuals by States, 1929–39. Survey of Current Business, October 1940.

[10] The established geographic areas with the States contained therein are as follows:

Northeastern. Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, and the District of Columbia.

Southern. Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas.

Central. Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas.

Western: Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, and California.

same time, because all but two States of the wealthiest quarter are located in either the Northeastern or Western area, it is strongly suggested that wealth is the primary factor and location the secondary, or incidental, one governing industrial hygiene expenditures.

Of particular interest is the source from which money expended for State industrial health activities is derived. Ninety-one percent of the aggregate sum was appropriated by State legislative bodies, while 7 percent was made up from Federal grants-in-aid (title VI of the Social Security Act), and fees accounted for most of the remaining 3 percent. When consideration is restricted to industrial hygiene programs budgeted as such, however, Federal aid assumes a much more significant proportion. Of approximately 422 thousand dollars expended through formally organized industrial hygiene units in State health departments, the Federal Government contributed 76 percent and the State only 24 percent.

Precise information regarding disbursements by State agencies for the health phases of workmen's compensation is scarce and scattered. Effort was made to obtain cost figures for benefits paid from State-operated insurance funds for medical, surgical, and hospital care of employees injured in industry or suffering from occupational illnesses contracted as a result of their employment. Inasmuch as private insurance carriers rarely report to the State agency the total amounts awarded as benefits for specific purposes, only those States administering systems which provide for compensation entirely through a State-operated fund could supply complete records of benefits distributed for medical, surgical, and hospital care. For these 8 States, namely, Nevada, North Dakota, Ohio, Oregon, Washington, West Virginia, Wyoming, and Puerto Rico, the annual compensation awards for the medical services listed exceed 8¼ million dollars. Since this group appears to be fairly representative of the country as a whole, it seems safe to estimate that for all States this figure would reach nearly 55 million dollars. Additional data supplied by 5 (North Dakota, Ohio, Oregon, Washington, and Puerto Rico) of the 8 States under discussion suggest that the benefits referred to represent roughly 28 percent of the total compensation awards, which, in addition to medical benefits, include death benefits, wage loss, and awards for total and partial and for temporary and permanent disability. The range of this percentage for the 5 States extends from 18 to 40. Nearly the entire sum paid out of the State compensation fund as benefits is derived from premiums.

DISCUSSION

Expansion during the past few years in the industrial hygiene activities of State health departments denotes an awakening interest in the problem of disabilities of industrial employees incurred through

employment and the possibilities of reducing such illnesses and accidents through elimination of hazards associated with particular industries. At the same time, an indication for further development of organized programs lies in the apportioning of total appropriations for industrial health activities. Less than 10 percent is assigned to health department programs, while more than 90 percent is allotted to miscellaneous activities, chiefly inspectional services.

To a varying degree, all States have taken some steps toward raising the health standards of industrial workers. In some, measures are limited to stipulation of working hours and to regulation of conditions of employment for women and children. In others, State authority extends to control of sanitation and safety of industrial establishments. Periodic inspections and suggestions for correction are, in the main, relied upon for rectifying conditions deemed dangerous. When necessary, legal action may be resorted to in securing corrections. Activities of a third group of States are broadened still further and include educational and advisory service to industries regarding elimination of health hazards, detailed technical investigations of the presence and concentration of toxic dusts, gases, fumes, and other substances conducive to physical disability of employees, and recommendations for removal of the hazardous conditions found.

For the most part, departments of labor and industrial commissions are charged with inspectional power and operate in accordance with the legal authority with which they are vested. Efforts are concentrated upon reduction of industrial accidents rather than upon prevention of occupational illnesses. Another indication of the more widespread interest shown in industrial accidents is the fact that all but 5 jurisdictions require central reporting of accidents sustained through employment, while only 33 require that illnesses so contracted shall be reported to a State agency. Health department activities, unlike those of labor departments and industrial commissions, are concerned chiefly with illness prevention. In two-thirds of the States where occupational illnesses are reportable, the health department—either singly, or jointly with another State agency— is the receiving agency, but in no instance are reports of industrial accidents forwarded thereto. It is the established policy for health departments to initiate industrial hygiene activities on a voluntary basis and to expand them by virtue of increasing requests from industry for the type of service offered.

While medical and nursing care constitute extremely important elements in plans for industrial health service, arrangements for such care and for dispensary facilities are usually made by each individual employer and not by an administrative agency of State government.

Certain aspects of workmen's compensation schemes, particularly arrangements for medical, surgical, and hospital care of beneficiaries of

the system, are closely allied with other health measures for industrial workers. However, administration of workingmen's compensation activities is usually carried on as a separate enterprise in State governmental organization. Industrial accidents are covered by State-wide compensation plans in all but 5 jurisdictions, but occupational illnesses are compensable in only 25.

State wealth, geographic position, and industrial development are all factors which appear to have a bearing upon a State's expenditure for industrial health services. Inasmuch as there is interrelationship among these factors, it is difficult to distinguish between direct and indirect influence. It is estimated that, in all, approximately 5 million dollars are expended annually by State agencies for the purpose of lowering illness and accident rates, since 41 States, including 92 percent of the total labor force, reported a disbursement of over 4½ million dollars. This represents, for the 41 States supplying fiscal data, an average cost per worker of $0.096, or a corresponding cost of $0.052 in the median State. Figures quoted are exclusive of State expenditures for workmen's compensation activities, only part of which are pertinent to this study.

DEATHS DURING WEEK ENDED DECEMBER 26, 1942

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Dec 26, 1942	Corresponding week 1941
Data from 87 large cities of the United States		
Total deaths	8,774	8,246
Average for 3 prior years	8,670	
Total deaths, first 51 weeks of year	428,750	423,756
Deaths per 1,000 population, first 51 weeks of year, annual rate	11 8	11 6
Deaths under 1 year of age	589	533
Average for 3 prior years	505	
Deaths under 1 year of age, first 51 weeks of year	29,730	26,906
Data from industrial insurance companies:		
Policies in force	65,273,961	64,769,523
Number of death claims	9,015	9,268
Death claims per 1,000 policies in force, annual rate	7 2	7.5
Death claims per 1,000 policies, first 51 weeks of year, annual rate	9 1	9 3

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 2, 1943

Summary

Current reports, as compared with the low figures for the preceding week, show increases for all of the nine common communicable diseases included in the following table. However, for diphtheria, poliomyelitis, typhoid fever, and whooping cough they are lower than for the second preceding week. Cumulative figures for 52 weeks for all of these diseases except measles and meningococcus meningitis are below the comparable 5-year median, and the 52-week total for only meningococcus meningitis (3,774) is above the comparable period of 1941.

Meningococcus meningitis reports for the week, totaling 187 cases, included 19 cases in New York (12 in New York City), 12 each in Oregon and California, and 10 each in Pennsylvania, Maryland, and Colorado. The total for the week is larger than reported for the corresponding week in any year since 1930 when 215 cases were reported.

A total of 3,440 cases of influenza was reported for the current week, about 50 percent more than for the preceding week. About 69 percent of the total was reported in three States: Texas (1,254), South Carolina (674), and Virginia (432) The next highest report was 194 cases in Alabama.

The total of 62 reported cases of smallpox includes delayed reports in Pennsylvania where 55 cases have been reported since the middle of November. Seven cases were reported in Texas and 5 each in Ohio and Indiana.

A total of 5,786 cases of measles for the current week is a 44 percent increase over the preceding week's figure, but only very slightly above the comparable 5-year median. Greatest numbers were re-

ported in Pennsylvania (1,362), New York (762), and Connecticut (411).

There were 50 cases of poliomyelitis reported, as compared with 36 for the preceding week and a corresponding 5-year median of 35. Texas reported 16 cases. No other State reported more than 3 cases.

Scarlet fever, typhoid fever, and whooping cough reports, while showing slight increases for the week, are all below their respective 5-year medians and comparable reports for last year.

Other reports for the current week are 158 cases of dysentery, 11 amebic, 95 bacillary (66 in Texas), and 52 unspecified (44 in Arizona); 36 cases of tularemia, and 67 of typhus fever.

The death rate for 88 cities was 14.1 per 1,000 population, as compared with 12.3 for the preceding week and a 3-year average of 12.8. The cumulative rates for 52 weeks were 11.8 for 1942 and 11.6 for 1941.

Telegraphic morbidity reports from State health officers for the week ended January 2, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1937–41	Week ended—		Median 1937–41	Week ended—		Median 1937–41	Week ended—		Median 1937–41
	Jan 2, 1943	Jan 3, 1942		Jan. 2, 1943	Jan 3, 1942		Jan 2, 1943	Jan 3, 1942		Jan. 2, 1943	Jan 3, 1942	
NEW ENG												
Maine	0	2	2	------	1	4	23	174	37	6	0	0
New Hampshire	0	0	0	------	4	------	49	18	12	1	0	0
Vermont	0	0	0	------	------	------	265	5	24	0	0	0
Massachusetts	4	9	3	------	------	------	392	166	180	6	1	1
Rhode Island	[4] 0	3	0	------	------	------	[4] 3	28	0	[4] 7	0	0
Connecticut	0	0	0	11	2	6	411	53	50	3	1	0
MID ATL												
New York	14	19	26	[1] 15	[1] 7	[1] 12	762	253	319	19	5	5
New Jersey	0	3	15	21	13	19	150	83	83	8	3	1
Pennsylvania	16	25	25	6	------	------	1,362	1,010	1,010	10	1	5
E NO CEN												
Ohio	15	21	25	9	13	35	42	90	90	5	0	0
Indiana	2	1	13	17	71	35	82	13	13	4	0	0
Illinois	19	34	36	24	15	20	84	50	50	8	3	2
Michigan [2]	15	10	10	8	2	2	99	59	172	4	2	1
Wisconsin	1	0	0	45	23	30	217	0	223	0	0	0
W. NO. CEN.												
Minnesota	1	2	1	------	------	2	6	151	67	0	0	0
Iowa	3	4	8	------	3	7	33	85	85	1	0	0
Missouri	11	3	8	1	5	29	7	18	18	6	1	1
North Dakota	2	7	3	15	2	12	3	31	10	0	1	0
South Dakota	1	2	2	1	------	1	97	0	2	0	1	0
Nebraska	2	3	2	------	------	------	106	11	3	3	0	0
Kansas	5	2	8	1	9	9	62	137	64	2	0	0
SO ATL												
Delaware	0	2	0	------	------	------	4	7	2	0	0	0
Maryland [3]	2	8	6	4	10	16	8	166	11	10	3	1
Dist of Col	1	4	2	4	------	5	4	6	2	1	0	0
Virginia	14	14	30	432	273	195	47	121	121	7	4	2
West Virginia	1	5	12	18	10	19	1	270	43	1	1	1
North Carolina	26	29	20	26	26	18	16	427	306	5	0	1
South Carolina	7	12	10	674	459	459	2	58	33	3	0	0
Georgia	4	14	10	65	58	124	14	76	8	2	0	0
Florida	6	5	5	1	13	13	4	9	9	0	2	2
E. SO. CEN												
Kentucky	6	4	6	25	------	22	51	6	18	2	2	3
Tennessee	1	7	8	18	32	42	14	228	68	0	0	1
Alabama	13	12	17	194	134	371	2	32	41	3	1	1
Mississippi [2]	9	11	11	------	------	------	------	------	------	2	0	1
W SO. CEN.												
Arkansas	14	12	15	108	93	192	34	77	44	5	3	0
Louisiana	9	8	9	10	6	10	9	3	3	2	2	1
Oklahoma	8	8	14	93	210	126	42	51	4	1	0	0
Texas	50	48	39	1,254	1,319	444	27	336	67	3	6	2
MOUNTAIN												
Montana	1	0	0	15	3	15	69	41	6	3	1	0
Idaho	2	0	0	2	------	5	38	11	11	0	0	0
Wyoming	0	0	0	55	8	8	2	4	2	1	2	0
Colorado	6	11	8	42	47	47	32	401	92	10	0	0
New Mexico	1	0	1	1	------	5	0	34	34	1	0	0
Arizona	2	2	2	119	104	104	10	28	9	0	0	0
Utah [3]	0	1	1	55	7	8	334	45	45	3	0	0
Nevada	0	0	------	------	------	------	29	0	------	1	0	------
PACIFIC												
Washington	3	0	2	3	3	2	393	22	22	4	0	0
Oregon	2	1	1	18	14	40	296	52	29	12	0	0
California	24	20	20	30	99	38	49	813	191	12	1	1
Total	323	388	497	3,440	3,098	3,098	5,786	5,759	5,759	187	47	43
52 weeks	[4] 15,559	17,008	24,086	109,167	423,251	292,271	[4] 505,861	866,609	374,854	[4] 3,774	2,039	2,039

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended January 2, 1943, and comparison with corresponding weeks of 1942 and 5-year median—Con.

Division and State	Poliomyelitis: Week ended— Jan. 2, 1943	Poliomyelitis: Week ended— Jan. 3, 1942	Poliomyelitis: Median 1937–41	Scarlet fever: Week ended— Jan. 2, 1943	Scarlet fever: Week ended— Jan. 3, 1942	Scarlet fever: Median 1937–41	Smallpox: Week ended— Jan. 2, 1943	Smallpox: Week ended— Jan. 3, 1942	Smallpox: Median 1937–41	Typhoid and paratyphoid fever: Week ended— Jan 2, 1943	Typhoid and paratyphoid fever: Week ended— Jan. 3, 1942	Typhoid and paratyphoid fever: Median 1937–41
NEW ENG.												
Maine	0	0	0	14	22	20	0	0	0	0	1	0
New Hampshire	0	0	0	16	3	3	0	0	0	0	0	0
Vermont	0	1	0	9	12	9	0	0	0	0	0	0
Massachusetts	1	0	0	311	283	124	0	0	0	1	1	1
Rhode Island	0	1	0	[4] 14	6	6	0	0	0	0	1	0
Connecticut	0	1	0	29	30	43	0	0	0	0	0	0
MID ATL.												
New York	1	6	2	285	332	364	0	0	0	2	4	4
New Jersey	2	3	0	60	97	114	0	0	0	0	1	3
Pennsylvania	1	2	0	180	211	258	[3] 34	0	0	2	7	7
E. NO CEN.												
Ohio	0	2	1	225	236	328	5	0	1	2	6	4
Indiana	2	0	0	78	79	117	5	6	6	0	1	1
Illinois	3	3	3	141	172	309	1	0	3	2	2	3
Michigan [3]	3	3	0	160	193	271	0	0	0	2	9	6
Wisconsin	1	2	1	183	145	157	0	0	5	0	2	1
W. NO. CEN.												
Minnesota	0	0	1	68	47	98	0	1	19	0	0	1
Iowa	2	0	0	50	40	82	1	1	12	0	0	0
Missouri	0	0	0	57	46	51	1	14	14	3	2	2
North Dakota	0	0	0	12	11	11	0	0	0	0	0	0
South Dakota	0	0	0	22	27	23	0	0	3	0	0	0
Nebraska	2	0	0	19	20	21	1	0	1	0	0	0
Kansas	1	1	0	60	66	71	0	0	0	0	0	0
SO. ATL.												
Delaware	0	0	0	11	21	12	0	0	0	0	0	0
Maryland [3]	0	0	0	29	53	35	0	0	0	1	4	3
Dist. of Col.	0	0	0	26	11	10	0	0	0	1	1	1
Virginia	0	0	0	50	30	39	0	0	0	5	12	6
West Virginia	1	0	0	28	54	48	0	0	0	0	3	1
North Carolina	0	0	0	98	70	50	1	0	0	0	1	1
South Carolina	1	0	0	11	11	9	0	0	0	2	1	1
Georgia	2	1	0	41	36	19	0	0	0	2	6	6
Florida	0	0	1	13	0	10	0	0	0	1	4	3
E. SO. CEN.												
Kentucky	1	0	1	41	89	58	1	0	0	1	2	0
Tennessee	0	2	0	21	49	37	0	0	0	0	3	2
Alabama	0	0	0	25	25	37	0	0	0	2	1	2
Mississippi [3]	1	1	1	16	26	10	0	0	0	1	0	0
W. SO CEN.												
Arkansas	0	2	2	9	9	17	1	1	5	2	0	2
Louisiana	0	3	0	11	5	8	0	0	0	4	3	6
Oklahoma	0	0	0	15	22	23	3	1	3	1	7	2
Texas	16	0	0	51	48	48	7	1	3	6	3	9
MOUNTAIN												
Montana	0	1	0	10	22	22	0	0	0	0	2	0
Idaho	0	0	0	17	8	8	0	0	0	0	0	0
Wyoming	1	1	0	46	6	6	0	0	0	0	3	0
Colorado	1	0	0	41	25	30	0	0	8	1	0	1
New Mexico	1	0	0	13	5	12	0	0	0	3	0	3
Arizona	1	0	0	6	6	6	1	0	0	1	0	0
Utah [3]	1	0	0	68	26	15	0	0	0	0	0	0
Nevada	0	0	-----	1	5	-----	0	0	-----	0	0	-----
PACIFIC												
Washington	0	0	0	42	67	48	0	0	2	0	0	0
Oregon	3	0	0	9	10	19	0	0	1	2	1	1
California	1	3	3	116	105	120	0	0	3	1	4	4
Total	50	39	35	2,858	2,922	3,497	62	25	118	51	96	104
52 weeks	4,193	9,090	9,090	[4] 126,853	127,735	162,052	863	1,356	9,574	6,703	8,395	12,736

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended January 2, 1943—Continued

Division and State	Whooping cough, Week ended— Jan. 2, 1943	Whooping cough, Week ended— Jan 3, 1942	Week ended Jan. 2, 1943: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt spotted fever	Tularemia	Typhus fever
NEW ENG.											
Maine	89	11	0	0	0	0	0	0	0	0	0
New Hampshire	15	12	0	0	0	0	0	0	0	0	0
Vermont	44	24	0	0	0	0	0	0	0	0	0
Massachusetts	184	110	0	0	1	0	0	0	0	0	0
Rhode Island	[4] 13	31	0	0	0	0	0	0	0	0	0
Connecticut	50	47	0	1	0	0	0	0	0	0	0
MID. ATL.											
New York	349	407	0	0	12	0	4	0	0	0	0
New Jersey	131	148	0	0	0	0	0	0	0	0	0
Pennsylvania	188	167	0	0	0	0	0	0	0	1	0
E. NO. CEN											
Ohio	104	116	0	0	0	0	2	0	0	1	0
Indiana	10	24	0	0	0	0	0	0	0	4	0
Illinois	123	178	0	0	2	0	0	0	0	9	0
Michigan [2]	351	461	0	3	4	0	0	0	0	0	0
Wisconsin	116	206	0	0	0	0	0	0	0	2	0
W. NO. CEN.											
Minnesota	30	21	0	2	0	0	0	0	0	0	0
Iowa	26	11	0	0	0	0	2	0	0	1	0
Missouri	13	7	0	0	0	0	0	0	0	0	0
North Dakota	16	9	0	0	0	0	0	0	0	0	0
South Dakota	7	2	0	0	0	0	1	0	0	0	0
Nebraska	2	11	0	0	0	0	0	0	0	0	0
Kansas	28	85	0	0	0	0	2	0	0	3	0
SO. ATL.											
Delaware	2	0	0	0	0	0	0	0	0	0	0
Maryland [2]	55	15	0	0	0	0	0	0	0	1	0
Dist of Col	13	23	0	0	0	0	0	0	0	0	0
Virginia	10	44	0	0	0	8	0	0	0	5	0
West Virginia	13	37	0	0	0	0	0	0	0	0	0
North Carolina	76	110	0	0	1	0	0	0	0	0	7
South Carolina	33	45	0	0	0	0	0	0	0	0	5
Georgia	4	7	0	1	0	0	0	0	0	1	15
Florida	6	10	0	1	2	0	0	0	0	0	6
E SO CEN.											
Kentucky	4	46	0	0	0	0	0	0	0	3	0
Tennessee	19	17	0	0	0	0	1	0	0	0	0
Alabama	44	3	0	0	0	0	0	0	0	1	9
Mississippi [2]	---	----	0	0	0	0	0	0	0	0	0
W. SO CEN.											
Arkansas	17	4	0	0	2	0	0	0	0	0	0
Louisiana	9	0	0	0	0	0	0	0	0	2	2
Oklahoma	13	7	0	0	0	0	0	0	0	0	0
Texas	163	64	0	1	66	0	1	0	0	0	23
MOUNTAIN											
Montana	18	14	0	0	0	0	0	0	0	0	0
Idaho	2	3	0	0	0	0	0	0	0	0	0
Wyoming	1	5	0	0	0	0	0	0	0	1	0
Colorado	10	13	0	0	1	0	0	0	0	0	0
New Mexico	18	9	0	0	0	0	1	0	0	0	0
Arizona	7	9	0	0	0	44	0	0	0	0	0
Utah [2]	37	47	0	0	0	0	0	0	0	0	0
Nevada	6	0	0	0	0	0	0	0	0	0	0
PACIFIC											
Washington	17	78	0	0	0	0	0	0	0	0	0
Oregon	7	23	0	0	0	0	0	0	0	0	0
California	139	111	0	2	4	0	2	0	0	1	0
Total	2,632	2,832	0	11	95	52	16	0	0	36	67
52 weeks	[4] 177,916	207,843									

[1] New York City only.
[2] Period ended earlier than Saturday
[3] Total of 55 cases reported in Pennsylvania to date; figure for week ended Jan. 2 includes delayed reports.
[4] Delayed report from Rhode Island for the week ended Dec. 19, 1942, shows instead, of figures previously published, 8 cases of diphtheria; 4 measles; 5 meningitis meningococcus; 10 scarlet fever; 40 whooping cough.

WEEKLY REPORTS FROM CITIES

City reports for week ended December 19, 1942

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga	0	0	8	1	2	0	2	0	8	0	0	4
Baltimore, Md	4	0	3	4	1	4	25	0	19	0	0	58
Barre, Vt	0	0	--	0	12	0	0	0	0	0	0	0
Billings, Mont	1	0	--	0	0	0	1	0	0	0	0	1
Birmingham, Ala	0	0	4	0	2	0	3	0	2	0	0	0
Boise, Idaho	0	0	-	0	0	0	0	0	1	0	0	0
Boston, Mass	0	0	-	0	26	2	14	1	66	0	0	33
Bridgeport, Conn	0	0	--	0	0	1	1	0	2	0	0	0
Brunswick, Ga	0	0	----	0	0	0	0	0	0	0	0	0
Buffalo, N. Y	0	0	----	2	89	0	7	0	21	0	0	22
Camden, N. J	1	0		0	3	0	3	0	2	0	0	2
Charleston, S. C	1	0	33	0	0	0	1	0	1	0	0	2
Charleston, W. Va	1	0		0	0	0	0	0	1	0	0	0
Chicago, Ill	15	1	4	1	59	1	34	0	53	0	1	71
Cincinnati, Ohio	1	0	2	0	8	0	5	0	16	0	0	12
Cleveland, Ohio	0	0	5	1	0	1	10	0	34	0	1	64
Columbus, Ohio	0	0	----	0	1	0	0	0	15	0	0	3
Concord, N. H	0	0	----	0	0	0	0	0	1	0	0	0
Cumberland, Md	0	0	----	0	1	0	0	0	0	0	0	0
Dallas, Tex	1	0	---	0	0	0	1	0	1	0	0	5
Denver, Colo	10	0	19	1	6	0	11	0	6	0	0	9
Detroit, Mich	2	0	----	2	4	1	30	0	30	0	0	129
Duluth, Minn	0	0	---	0	1	0	0	0	0	0	0	2
Fall River, Mass	1	0	----	0	1	0	1	0	6	0	0	17
Fargo, N. Dak	0	0	---	0	0	0	1	0	3	0	0	3
Flint, Mich	3	0	----	0	1	0	0	0	7	0	0	9
Fort Wayne, Ind	1	0	----	0	0	0	2	0	0	0	0	0
Frederick, Md	0	0	-	0	0	0	0	1	0	0	0	0
Galveston, Tex	1	0	-	0	0	0	1	2	0	0	0	0
Grand Rapids, Mich	0	0	1	0	1	0	3	0	2	0	0	3
Great Falls, Mont	0	0	----	0	0	0	0	0	6	0	0	0
Hartford, Conn	0	0	----	0	1	0	3	0	2	0	0	2
Helena, Mont	0	0	----	0	0	0	0	0	0	0	0	0
Houston, Tex	1	0	----	0	0	0	4	1	2	0	0	5
Indianapolis, Ind	0	0	----	1	11	0	8	0	9	0	1	3
Kansas City, Mo	0	0	----	0	2	1	4	0	25	0	0	4
Kenosha, Wis	0	0	----	0	0	0	0	0	5	0	0	0
Little Rock, Ark	0	0		0	0	0	4	0	0	0	0	0
Los Angeles, Calif	2	0	14	1	8	1	10	3	21	0	0	17
Lynchburg, Va	0	0	----	0	0	0	1	0	1	0	0	0
Memphis, Tenn	0	0	5	3	1	0	4	0	5	0	0	9
Milwaukee, Wis	0	0	1	1	58	0	3	0	58	0	0	23
Minneapolis, Minn	0	0	----	0	1	0	5	1	16	0	0	16
Missoula, Mont	0	0	---	0	0	0	0	0	0	0	0	0
Mobile, Ala	1	0	2	4	0	0	3	0	0	0	0	0
Nashville, Tenn	0	0	---	0	5	0	1	0	2	0	0	1
Newark, N. J	0	0	5	0	9	1	6	0	7	0	0	13
New Haven, Conn	0	0	---	0	1	0	0	0	1	0	1	8
New Orleans, La	1	0	2	1	0	0	10	0	0	0	0	2
New York, N. Y	19	0	12	3	14	14	66	1	156	0	2	81
Omaha, Nebr	2	0	---	0	0	0	7	0	1	0	0	1
Philadelphia, Pa	1	0	2	0	556	4	39	0	63	0	0	110
Pittsburgh, Pa	1	0	2	1	1	1	11	0	16	0	1	16
Portland, Maine	0	0	----	0	1	1	3	0	1	0	0	10
Providence, R. I	1	1	1	2	0	2	4	0	6	0	0	27
Pueblo, Colo	0	1	----	0	0	0	0	0	3	0	0	0
Racine, Wis	0	0	----	0	9	0	0	0	10	0	0	2
Reading, Pa	0	0	----	0	9	1	1	0	0	0	0	16
Richmond, Va	1	0	----	0	0	0	3	0	1	0	0	8

City reports for week ended December 19, 1942—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Roanoke, Va	0	0		0	0	0	0	0	1	0	0	0
Rochester, N. Y	0	0		0	5	0	7	0	3	0	0	10
Sacramento, Calif	3	0		0	1	0	5	0	11	0	1	2
Saint Joseph, Mo	0	0		0	0	0	8	0	0	0	0	0
Saint Louis, Mo	2	0	3	0	2	2	13	0	12	0	0	3
Saint Paul, Minn	0	0		1	1	0	3	0	2	0	0	23
Salt Lake City, Utah	0	0		0	150	0	3	0	4	0	0	19
San Antonio, Tex	2	0	2	3	0	0	5	7	6	0	0	0
San Francisco, Calif	0	0		0	1	2	12	0	5	0	0	11
Savannah, Ga	0	0	4	3	0	0	5	0	0	0	0	0
Seattle, Wash	2	0		2	17	0	7	0	4	0	0	8
Shreveport, La	0	0		0	0	0	6	0	0	0	0	0
South Bend, Ind	0	0		0	1	0	0	0	1	0	0	0
Spokane, Wash	1	0		0	38	0	2	0	4	0	0	1
Springfield, Ill	0	0		1	1	0	5	0	1	0	0	23
Springfield, Mass	0	0		0	7	0	4	0	83	0	0	5
Syracuse, N. Y	0	0		1	0	0	2	0	1	0	0	32
Tacoma, Wash	0	0		0	99	0	2	0	0	0	0	1
Tampa, Fla	0	0	2	1	0	0	6	0	0	0	0	0
Topeka, Kans	0	0		0	19	0	1	0	1	0	0	0
Trenton, N J	0	0	1	1	0	0	2	0	3	0	0	1
Washington, D. C	1	1	3	0	2	2	12	0	14	0	1	14
Wheeling, W. Va	0	0		0	0	0	0	0	0	0	0	0
Wichita, Kans	0	1		0	2	0	3	1	7	0	0	3
Wilmington, Del	0	0		0	0	0	2	0	0	0	0	1
Wilmington, N. C	0	0		0	0	0	4	0	1	0	0	2
Winston-Salem, N. C	0	0		0	0	0	3	0	2	0	0	5
Worcester, Mass	0	0		0	2	0	11	0	12	0	0	23

Anthrax.—Cases: Wilmington, Del., 1.
Dysentery, amebic.—Cases: Atlanta, 3; Detroit, 1, Los Angeles, 1
Dysentery, bacillary.—Cases: Baltimore, 9, Buffalo, 7, Detroit, 1, Los Angeles, 7, New York, 9.
Leprosy.—Cases: New Orleans, 1.
Tularemia.—Cases: Indianapolis, 1.
Typhus fever.—Cases: Atlanta, 3, Charleston, S. C., 1; Dallas, 2, Galveston, 1, Nashville, 1, New Orleans, 1, New York, 1, Savannah, 2

Rates (annual basis) per 100,000 population for the group of 87 cities included in the preceding table (estimated population, 1942, 33,986,378)

Period	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
		Cases	Deaths						
Week ended Dec. 19, 1942	12 89	21 48	6 44	192 24	75 02	136 85	0 00	1.38	154 19
Average for week 1937–41	18 45	39 38	[1] 5 86	[2] 184 51	[1] 62 04	150 71	2.02	3 26	166 52

[1] 3-year average, 1939–41
[2] 5-year median

PLAGUE INFECTION IN TACOMA, WASHINGTON

Under dates of December 21 and 22, 1942, plague infection was reported proved in fleas and tissue from rats, *R. norvegicus*, collected in Tacoma, Washington, as follows: In a pool of 12 fleas from 1 rat taken December 2; in tissue from 1 rat taken December 10; in a pool of 139 fleas from 330 rats taken December 9 and December 11.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—Rats proved positive for plague have been reported in Hamakua District, Island of Hawaii, T. H., as follows: Week ended December 5, 1942, 2 plague infected rats in Kapulena area and 2 plague infected rats in Paauhau area. Week ended December 12, 1942, 1 plague infected rat in Honokaa area, and 6 plague infected rats in Paauhau area.

Panama Canal Zone

Notifiable diseases—October 1942.—During the month of October 1942, certain notifiable diseases were reported in the Panama Canal Zone, and terminal cities, as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	19		11		2		3		35	
Diphtheria	12		8		[1] 12		5		37	
Dysentery (amebic)	6	1	1				2		9	1
Dysentery (bacillary)	1				3		1		5	
Malaria [2]	20	1	4		460		166	4	650	5
Measles	5				22				27	
Meningitis, meningococcus			1						1	
Mumps	4						1		5	
Paratyphoid fever					2				2	
Pneumonia		4		5	27			4	[3] 27	13
Tuberculosis		21		12	6	1		5	[3] 6	39
Typhoid fever	2		4						6	

[1] Includes 2 carriers.
[2] Includes 173 recurrent cases.
[3] Cases reported in the Canal Zone only.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended December 5, 1942.—During the week ended December 5, 1942, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		2		2	5		1	1		11
Chickenpox		23		90	405	126	117	22	111	894
Diphtheria		22	7	24	2	5	1		1	62
Dysentery				2						2
Encephalomyelitis				1						1
German measles		1		11	12		1	3	7	35
Influenza		16			1	7			14	38
Lethargic encephalitis				1						1
Measles		1		69	105	6	46	2	10	239
Mumps		58	1	247	548	57	54	38	207	1,210
Pneumonia		27			11				24	62
Poliomyelitis			1	1		1				3
Scarlet fever		18	6	42	95	8	15	47	35	266
Tuberculosis		8	6	54	47	5	15		34	169
Typhoid and paratyphoid fever			3	4	1					8
Undulant fever					2					2
Whooping cough		13	1	113	128	41	5	5	20	326
Other communicable diseases		19		4	246	33			3	305

EGYPT

Infectious diseases—Second quarter 1942.—During the second quarter of 1942, certain infectious diseases were reported in Egypt as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	1		Mumps	451	5
Cerebrospinal meningitis	60	31	Plague	2	
Chickenpox	319	4	Pneumonia	2,012	1,690
Diphtheria	574	288	Puerperal septicemia	91	68
Dysentery	1,088	171	Rabies	13	13
Erysipelas	992	106	Scarlet fever	6	1
Influenza	4,202	77	Tetanus	107	85
Jaundice, epidemic	1		Tuberculosis	1,781	1,057
Leprosy	130	24	Typhoid fever	1,989	326
Lethargic encephalitis	1	1	Typhus fever	11,679	2,540
Malaria	4,130	13	Undulant fever	3	1
Measles	4,883	1,958	Whooping cough	870	60

Vital statistics—Second quarter 1942.—Following are the numbers of births and deaths for the second quarter of 1942 for all localities of Egypt having a health bureau:

Number of live births	56,082
Births per 1,000 population	40 4
Deaths, all causes	65,047
Deaths per 1,000 population	46 9
Deaths under 2 years of age	20,288
Deaths under 2 years of age per 1,000 live births	362

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month

(Few reports are available from the invaded countries of Europe and other nations in war zones)

Yellow Fever

Bolivia.—Yellow fever has been reported in Bolivia as follows: Chuquisaca Department, May 1942, 1 death; La Paz Department, June 1942, 7 cases, 3 deaths; Santa Cruz Department, April 1942, 6 cases, 4 deaths, May 1942, 12 cases, 7 deaths.

×

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements, should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 58 JANUARY 15, 1943 NUMBER 3

IN THIS ISSUE

Public Health Service Drinking Water Standards
Manual of Recommended Water Sanitation Practice

U.S. PUBLIC HEALTH SERVICE
1798

CONTENTS

Public Health Reports

Vol. 58 • **JANUARY 15, 1943** • *No. 3*

PUBLIC HEALTH SERVICE DRINKING WATER STANDARDS

UNITED STATES PUBLIC HEALTH SERVICE,
Washington, D. C., September 25, 1942.

ADOPTION

The Public Health Service hereby adopts the standards of purity for drinking water recommended by the Advisory Committee on Revision of the 1925 Drinking Water Standards, appointed by the Surgeon General in February 1941.

These Standards are adopted for use in the administration of the Interstate Quarantine Regulations as they relate to the drinking and culinary water supplied by common carriers in interstate commerce. The manual of recommended water sanitation practice is intended to serve as a guide to the reporting agency and not as a part of the official Standards which must be complied with to obtain certification of the water supply.

In the future common carriers will be required to furnish drinking and culinary water for passengers and crews in interstate traffic which will conform to these standards.

(S) THOMAS PARRAN,
Surgeon General, United States Public Health Service.

Approved: Dec. 3, 1942
(S) Watson B. Miller,
Acting Administrator, Federal Security Agency.

PREFACE TO THE 1925 EDITION

The preface of the 1925 Drinking Water Standards is presented below and represents the ideas and report of the Advisory Committee which assisted in the preparation of those Standards. This material is presented as an historical background upon which some of the findings of the present committee have been based.

In recommending the adoption of these standards the Advisory Committee submitted a report discussing the requirements as follows:

REPORT OF THE ADVISORY COMMITTEE ON OFFICIAL WATER STANDARDS [1]

The task referred to this committee by the Surgeon General of the Public Health Service is to formulate definite specifications which may be used by the Public Health Service in the administrative action which it is required to take upon the supplies of drinking water offered by common carriers for the use of passengers carried in interstate traffic. The recommendations submitted apply, therefore, only to this special case, and are not proposed for more general application.

Since the purpose of the supervision which the Public Health Service exercises over these water supplies is to safeguard the health of the public, the examinations and specific requirements herein proposed have reference chiefly to forming a

[1] Pub. Health Rep., 40: 693–721 (April 10, 1925).

judgment of safety, and are designed especially to afford protection against the most serious danger which is associated with water supplies; namely, that of infection with typhoid fever and other diseases of similar origin and transmission. Less emphasis has been placed upon physical and chemical characteristics affecting the acceptability of water with respect to appearance, taste, and odor, because these are matters of less fundamental importance and because, in actual experience, the water supplies which come under consideration, if satisfactory from the standpoint of safety, will usually be found satisfactory with respect to physical and chemical characteristics.

The first step toward the establishment of standards which will insure the safety of water supplies conforming to them is to agree upon some criterion of safety. This is necessary because "safety" in water supplies, as they are actually produced, is relative and quantitative, not absolute. Thus, to state that a water supply is "safe" does not necessarily signify that absolutely no risk is ever incurred in drinking it. What is usually meant, and all that can be asserted from any evidence at hand, is that the danger, if any, is so small that it cannot be discovered by available means of observation. Nevertheless, while it is impossible to demonstrate the absolute safety of a water supply, it is well established that the water supplies of many of our large cities are safe in the sense stated above, since the large populations using them continuously have, in recent years, suffered only a minimal incidence of typhoid fever and other potentially water-borne infections. Whether or not these water supplies have had any part whatsoever in the conveyance of such infections during the period referred to is a question that cannot be answered with full certainty; but the total incidence of the diseases has been so low that even though the water supplies be charged with responsibility for the maximum share which may reasonably be suggested, the risk of infection through them is still very small compared to the ordinary hazards of everyday life.[3]

The committee has, therefore, taken this better class of municipal water supplies as its standard of comparison with respect to safety and proposes, as a fair objective, that the water supplies furnished by common carriers to passengers in interstate traffic be of comparable safety. As regards protection of the traveling public, such a standard is fair, since it implies that the use of the water supplied to them in travel shall not add to the almost negligible risk which is ordinarily incurred at home by those who habitually use water supplies of somewhat better than average quality. From the standpoint of the carriers also, this standard is believed to be fair and reasonable, since it refers to water supplies which are actually obtainable in all sections of the country and from a great variety of sources.

The next and principal task of the committee has been to set up objective requirements which will conform to this general standard of safety; that is, requirements which will ordinarily be fulfilled by the municipal supplies of epidemiologically demonstrated safety which constitute the standard of comparison, but will exclude supplies of less assured safety. Since there is no single and measurable characteristic of water supplies which bears any known and constant relation to actual safety, the standard recommended is composite, including certain requirements relative to the source and protection of the water supplies in question as indicated by a careful sanitary survey, and certain other requirements relative to bacterial content as shown by standard tests.

---

[3] This evidence actually proves only that the water supplies in question have been generally "safe" in the past during the period of low prevalence of infection. The likelihood that they will continue to be equally or more safe in the future must, of course, be reckoned from other considerations, such as the probability of future change in the pollution of their watershed, the character and consistency of their protection,

It is anticipated that little objection will be raised to the requirements laid down as to source and protection, at least to their general intent, because they are based upon well recognized principles of sanitary engineering, and because they are necessarily stated in general terms which imply a rather broad consideration of each supply from all angles and the exercise of discretion in forming an ultimate judgment of its fitness. The bacteriological standard, on the other hand, is stated in definite quantitative terms. This is unavoidable if such a standard be included at all, since the methods of bacteriological examinations are quantitative and yield results in the definite terms used in the standard. However, in view of the well-recognized principle that the significance of bacteriological examinations is variable, and must be interpreted with due regard to all other facts known about the particular water supply in question, the objection may be raised that a rigid application of this standard will arbitrarily exclude a considerable number of water supplies which conform to all other requirements and which competent opinion will consider to be quite safe. The validity of this criticism is recognized, but it is not considered of sufficient force to require or justify the lowering of the bacteriological standard proposed. This viewpoint appears proper when it is recognized that the definite terms of bacteriological quality in which this standard is expressed represent only agreement as to safety, and not as to limiting values beyond which demonstrable or even presumptive danger lies. Between the point on which the committee is in agreement as to the assured safety of water supplies and the point at which agreement could be reached as to their dangerous quality is a wide zone. Within the zone lie many water supplies which, if considered in the light of available evidence from all angles, are believed to be as safe as other supplies which conform to all the bacteriological requirements.

The committee, therefore, considers it preferable to recommend that in actual practice the bacteriological standard be applied, as are other requirements, with some latitude; in other words, that supplies which, on rigid inspection, are found to be satisfactory in other respects but fail to meet the bacteriological standard, may be accepted in the discretion of the certifying authority. In view of the character of the personnel entrusted with the responsibility for investigation and administrative action, the committee feels assured that this procedure is preferable to the alternative of rigid and automatic application.

PUBLIC HEALTH SERVICE DRINKING WATER STANDARDS

Standards Adopted by the United States Public Health Service, Federal Security Agency, September 25, 1942, for Drinking and Culinary Water Supplied by Common Carriers in Interstate Commerce

(Superseding standard adopted June 20, 1925)[1]

In recommending the adoption of the revised Standards the Advisory Committee submitted a report discussing the requirements as follows:

REPORT OF THE ADVISORY COMMITTEE ON OFFICIAL WATER STANDARDS

The requirements for drinking (and culinary) water provided by common carriers for the use of passengers carried in interstate traffic, commonly known as the "Treasury Department Drinking Water Standards," were last revised in 1925, and published in the Public Health Reports of April 10 of that year. Since that time many improvements in water supply practice have been adopted with resulting increased uniformity of quality and safety to the consumer. Moreover, the Public Health Service, in recent years, has been requested by the American Public Health Association, the American Water Works Association, and the American Chemical Society to review the 1925 Standards. Accordingly, the Public Health Service has undertaken a revision of the Standards in order to have them conform more closely to current requirements for water supplies of attainable safety and potability.

To carry out such a revision the Surgeon General of the Public Health Service, on February 27, 1941, appointed the undersigned special Advisory Committee composed of representatives of various Federal organizations and scientific associations and including several members at large. A smaller subcommittee of Public Health Service officers was designated to prepare tentative suggestions for the consideration of the Advisory Committee.

After thorough consideration, the advisory committee recommends the adoption of the revisions as set forth in the text herewith submitted. The principal changes now proposed are:

(1) A distinct separation of the text into: (*a*) that portion containing the statement of the Standards, and (*b*) that portion constituting a recommended manual of water works practice representing the judgment of the technical subcommittee composed of officers of the Public Health Service. This portion of the text is intended to serve as a guide to the reporting agency and should not be

[1] Pub. Health Rep., 40: 693–721 (April 10, 1925).

considered as indicating additional requirements to be met for certification of the water supply.

(2) In the bacteriological section the use of 5–10 ml. portions or of 5–100 ml. portions is made optional; a minimum number of samples is to be examined monthly, the number depending upon the population served; the laboratories in which bacteriological examinations are made and the methods used in making them are subject to inspection at any time by the designated representative of the certifying authority.

(3) Concentration limits for lead, fluoride, arsenic, and selenium are included as part of the Standards and their presence in excess of the limits stated shall constitute ground for rejection of the supply. Limits in concentration that should not be exceeded, where other more suitable supplies are available, are given for copper, iron and manganese together, magnesium, zinc, chloride, sulfate, phenolic compounds, total solids, and alkalinity.

(4) The results of recent studies on the potential pollutional hazards existing in the water supply systems of our communities due to faulty plumbing practices, cross-connections, interconnections, etc., as well as the pollutional hazards which are due to faulty water plant and distribution system operational practices, any or all of which may jeopardize the safety of the water in the distribution system, have been adjudged as being of prime importance in the consideration of the requirements of these Standards. The utmost care and consideration have been given to the inclusion of those provisions which would serve to detect possible contamination arising in the distribution system and thus lead to its correction and further safeguarding of the traveling public.

The Committee believes that, in general, water supplies to be eligible for certification should meet all (sanitary, chemical, and bacteriological) requirements of the Standards and that definite failure to meet any one of them should be ground for rejection or provisional certification, according to the judgment of the certifying authority. However, it is realized that the statement of an official standard of drinking water quality, to be generally applicable, must be interpreted reasonably. The Committee has attempted to take into consideration all aspects of the problem. It offers these Standards with the recommendation that the judgment and discretion of the certifying authority be exercised in their application.

MEMBERSHIP OF ADVISORY COMMITTEE ON REVISION OF THE DRINKING WATER STANDARDS[1]

Joseph W. Mountin, *Chairman, Assistant Surgeon General, States Relations Division, U. S. Public Health Service, Washington, D. C.*

J. K. Hoskins, *Secretary, Senior Sanitary Engineer, Chief, Sanitation Section, U. S. Public Health Service, Washington, D. C.*

REPRESENTATIVES OF FEDERAL ORGANIZATIONS

Food and Drug Administration: J. W. Sale, Senior Chemist, Food Division, Federal Security Agency, Washington, D. C.

U. S. Geological Survey: W. D. Collins, Chemist in Charge, Quality of Water Division, Department of the Interior, Washington, D. C.

REPRESENTATIVES OF SCIENTIFIC ASSOCIATIONS

American Chemical Society: A. M. Buswell, Chief, Illinois State Water Survey Division, Urbana, Ill.

American Public Health Association: Abel Wolman, Professor of Sanitary Engineering, Johns Hopkins University, Baltimore, Md.

American Society of Civil Engineers: Arthur E. Gorman, Engineer of Water Purification, Bureau of Engineering, Department of Public Works, Chicago, Ill.

American Water Works Association: Charles R. Cox, Chief, Bureau of Water Supply, State Department of Health, Albany, N. Y.

Association of American Railroads: R. C. Bardwell, Superintendent, Water Supply, Chesapeake and Ohio Railroad, Richmond, Va.

Conference of State Sanitary Engineers: Arthur D. Weston, Director and Chief Engineer, Division of Sanitary Engineering, State Department of Health, Boston, Mass.

Society of American Bacteriologists: A. C. Hunter, Principal Bacteriologist, Food and Drug Administration, Federal Security Agency, Washington, D. C.

MEMBERS AT LARGE

Herman G. Baity, Professor of Sanitary Engineering, University of North Carolina, Chapel Hill, N. C.

R. E. Buchanan, Director, Agricultural Experiment Station, Iowa State College, Ames, Iowa.

R. F. Goudey, Sanitary Engineer, Bureau of Water Works and Supply, Los Angeles, Calif.

Technical Subcommittee, Officers of the Public Health Service

J. K. Hoskins, Senior Sanitary Engineer, Chief, Sanitation Section, States Relations Division, Washington, D. C. (Secretary).

R. E. Tarbett, Senior Sanitary Engineer, Washington, D. C.

H. W. Streeter, Senior Sanitary Engineer, Stream Pollution Investigations, Cincinnati, Ohio.

C. T. Butterfield, Principal Bacteriologist, Stream Pollution Investigations, Cincinnati, Ohio.

C. C. Ruchhoft, Principal Chemist, Stream Pollution Investigations, Cincinnati, Ohio.

Lawrence T. Fairhall, Principal Industrial Toxicologist, National Institute of Health, Bethesda, Md.

[1] Official positions indicated are as of February 27, 1941, when the Committee was organized.

PART I—PUBLIC HEALTH SERVICE STANDARDS

1. DEFINITION OF TERMS

For the purpose of these Standards the terms designated herein below shall be defined as follows:

1.1. *Adequate protection by natural agencies* implies various relative degrees of protection against the effects of pollution in surface waters; dilution, storage, sedimentation, the effects of sunlight and aeration, and the associated physical and biological processes which tend to produce natural purification; and, in the case of ground waters, storage in and percolation through the water bearing material.

1.2. *Artificial treatment* includes the various processes commonly used in water treatment, both separately and in combination, such as storage, aeration, sedimentation, coagulation, rapid or slow sand filtration, chlorination, and other accepted forms of disinfection. Rapid sand filtration treatment is commonly understood to include those auxiliary measures, notably coagulation and sedimentation, which are essential to its proper operation.

1.3. *Adequate protection by artificial treatment* implies that the method and degree of elaboration of treatment are appropriate to the source of supply; that the works are of adequate capacity to support maximum demands, are well located, designed, and constructed, are carefully and skillfully operated and supervised by properly trained and qualified personnel, and are adequately protected against floods and other sources of pollution. The evidence that the protection thus afforded is adequate must be furnished by frequent bacteriological examinations and other appropriate analyses showing that the purified water is of good and reasonably uniform quality, a recognized principle being that irregularity in quality is an indication of potential danger. A minimum specification of good quality would be conformance to the bacteriological and chemical requirements of these Standards, as indicated in sections 3 and 4.

1.4. *Sanitary defect* means any faulty structural condition, whether of location, design or construction of water collection, treatment or distribution works, which may regularly or occasionally cause the water supply to be contaminated from an extraneous source, including dual supplies, by-passes, cross-connections, or interconnections (backflow connections) or fail to be satisfactorily purified.

1.5. *Health hazard* means any faulty operating condition including any device or water treatment practice, which, when introduced into the water supply system, creates or may create a danger to the well-being of the consumer.

1.6. *Water supply system* includes the works and auxiliaries for collection, treatment, and distribution of the water from the source of supply to the free-flowing outlet of the ultimate consumer.

1.7. *The coliform group of bacteria* is defined, for the purpose of these Standards, as including all organisms considered in the coli-aerogenes group as set forth in the Standard Methods for the Examination of Water and Sewage, eighth edition (1936), prepared, approved, and published jointly by the American Public Health Association and the American Water Works Association, New York City. The procedures [1] for the demonstration of bacteria of this group shall be those specified herein, for:

(*a*) The completed test, or

(*b*) The confirmed test when the liquid confirmatory medium brilliant green bile lactose broth, 2 percent, is used, providing the formation of gas in any amount in this medium during 48 hours of incubation at 37° C. is considered to constitute a positive confirmed test, or

(*c*) The confirmed test when one of the following liquid confirmatory media is used: crystal violet lactose broth, fuchsin lactose broth, or formate ricinoleate broth. For the purpose of this test, all are equivalent, but it is recommended that the laboratory worker base his selection of any one of these confirmatory media upon correlation of the confirmed results thus obtained with a series of completed tests, and that he select for use the liquid confirmatory medium yielding results most nearly agreeing with the results of the completed test. The incubation period for the selected liquid confirmatory medium shall be 48 hours at 37° C. and the formation of gas in any amount during this time shall be considered to constitute a positive confirmed test.

1.8. *The standard portion of water* for the application of the bacteriological test may be either:

(*a*) Ten milliliters (10 ml.) or

(*b*) One hundred milliliters (100 ml.)

1.9. *The standard sample* for the bacteriological test shall consist of five (5) standard portions of either:

(*a*) Ten milliliters (10 ml.) or

(*b*) One hundred milliliters (100 ml.) each.

In any disinfected supply the sample must be freed of any disinfecting agent within twenty (20) minutes of the time of its collection.[2]

1.10. *The certifying authority* is the Surgeon General of the United States Public Health Service or his duly authorized and designated

[1] This reference shall apply to all details of technique in the bacteriological examination, including the selection and preparation of apparatus and media, the collection and handling of samples, and the intervals and conditions of storage allowable between collection and examination of the water sample.

[2] In freeing samples of chlorine or chloramines, the procedure given on page 286 in the Standard Methods for the Examination of Water and Sewage, eighth edition (1936), paragraph A-1—option 1, or paragraph A-2 shall be followed.

representatives and the *reporting agency* shall be understood to mean the respective State departments of health or their designated representatives.

2. AS TO SOURCE AND PROTECTION

2.1. The water supply shall be:

(*a*) Obtained from a source free from pollution; or

(*b*) Obtained from a source adequately purified by natural agencies; or

(*c*) Adequately protected by artificial treatment.

2.2. The water supply system in all its parts shall be free from sanitary defects and health hazards and shall be maintained at all times in a proper sanitary condition.

3. AS TO BACTERIOLOGICAL QUALITY

3.1. *Sampling.*—The bacteriological examination of water considered under this section shall be of samples collected at representative points throughout the distribution system.

The frequency of sampling and the location of sampling points on the distribution system should be such as to determine properly the bacteriological quality of the water supply. The frequency of sampling and the distribution of sampling points shall be regulated by the certifying authority after investigation of the source, method of treatment, and protection of the water concerned.

The minimum number of samples to be collected from the distribution system and examined by the reporting agency or its designated representative each month should be in accordance with the number as determined from the graph presented in figure 1 of these Standards[3] which is based upon the relationship of population served and minimum number of samples per month:

Population served	*Minimum number of samples per month*
2,500 and under	1
10,000	7
25,000	25
100,000	100
1,000,000	300
2,000,000	390
5,000,000	500

The laboratories in which these examinations are made and the methods used in making them shall be subject to inspection at any

[3] For the purpose of uniformity and simplicity in application, the number of samples to be examined each month for any given population served shall be determined from the graph in accordance with the following:

For populations of 25,000 and under to the nearest 1.
For populations of 25,001 to 100,000 to the nearest 5.
For populations of 100,001 to 2,000,000 to the nearest 10.
For populations of over 2,000,000 to the nearest 25.

time by the designated representative of the certifying authority. Compliance with the specified procedures, or failure to comply therewith, and the results obtained shall be used as a basis for certification,

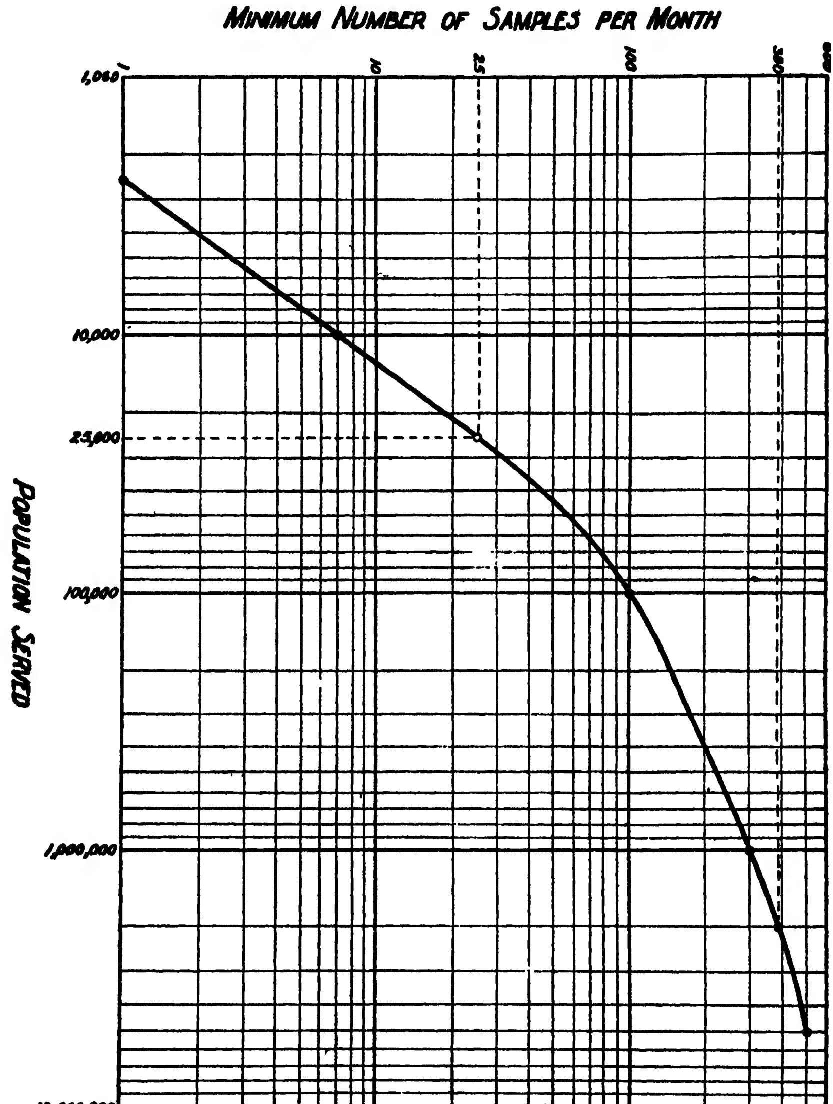


FIGURE 1.—Relation between minimum number of samples to be collected per month and population served.

or refusal of certification, by the certifying authority in accordance with the application given below.

3.2. *Application.*—Applications 3.21 and 3.22 given below shall

govern when ten milliliter (10 ml.) portions are used and applications 3.23 and 3.24 shall govern when one hundred milliliter (100 ml.) portions are used.[4]

3.21. Of all the standard ten milliliter (10 ml.) portions examined per month in accordance with the specified procedure, not more than ten (10) percent shall show the presence of organisms of the coliform group.

3.22. Occasionally three (3) or more of the five (5) equal ten milliliter (10 ml.) portions constituting a single standard sample may show the presence of organisms of the coliform group, provided that this shall not be allowable if it occurs in consecutive samples or in more than

(*a*) Five (5) percent of the standard samples when twenty (20) or more samples have been examined per month.

(*b*) One (1) standard sample when less than twenty (20) samples have been examined per month.

Provided further that when three or more of the five equal ten milliliter (10 ml.) portions constituting a single standard sample show the presence of organisms of the coliform group, daily samples from the same sampling point shall be collected promptly and examined until the results obtained from at least two consecutive samples show the water to be of satisfactory quality.[5]

3.23. Of all the standard one hundred milliliter (100 ml.) portions examined per month in accordance with the specified procedure, not more than sixty (60) percent shall show the presence of organisms of the coliform group.

3.24. Occasionally all of the five (5) equal one hundred milliliter (100 ml.) portions constituting a single standard sample may show the presence of organisms of the coliform group, provided that this shall not be allowable if it occurs in consecutive samples or in more than

(*a*) Twenty (20) percent of the standard samples when five (5) or more samples have been examined per month.

(*b*) One (1) standard sample when less than five (5) samples have been examined per month.

Provided further that when all five of the standard one hundred milliliter (100 ml.) portions constituting a single standard sample show the presence of organisms of the coliform group, daily samples from the same sampling point shall be collected promptly

[4] It is to be understood that in the examination of any water supply the series of samples for any one month must conform to both of the above requirements, either 3.21 and 3.22 or 3.23 and 3.24, respectively.

[5] When this occurs, and when waters of unknown quality are being examined, simultaneous tests should be made on multiple portions of a geometric series ranging from 10 ml to 0.1 ml. or less.

and examined until the results obtained from at least two consecutive samples show the water to be of satisfactory quality.[6]

3.25. The procedure given, using a standard sample composed of five standard portions, provides for an estimation of the most probable number of coliform bacteria present in the sample as set forth in the following tabulation:

Number of portions		Most probable number of coliform bacteria per 100 ml	
Negative	Positive	When 5-10 ml. portions are examined	When 5-100 ml. portions are examined
5	0	Less than 2.2	Less than 0.22
4	1	2.2	.22
3	2	5.1	.51
2	3	9.2	.92
1	4	16.0	1.60
0	5	More than 16.0	More than 1.60

4. AS TO THE PHYSICAL AND CHEMICAL CHARACTERISTICS

4.1. *Physical characteristics.*—The turbidity of the water shall not exceed 10 p.p.m. (silica scale), nor shall the color exceed 20 (standard cobalt scale). The water shall have no objectionable taste or odor.

4.2. *Chemical characteristics.*—The water shall not contain an excessive amount of soluble mineral substance, nor excessive amounts of any chemicals employed in treatment. Under ordinary circumstances, the analytical evidence that the water satisfies the physical and chemical standards given in sections 4.1 and 4.21 and simple evidence that it is acceptable for taste and odor will be sufficient for certification with respect to physical and chemical characteristics.

4.21. The presence of lead (Pb) in excess of 0.1 p. p. m., of fluoride in excess of 1.0 p. p. m., of arsenic in excess of 0.05 p. p. m., of selenium in excess of 0.05 p. p. m., shall constitute ground for rejection of the supply.

These limits are given in parts per million by weight and a reference to the method of analysis recommended for each determination is given in section 4.31. Salts of barium, hexavalent chromium, heavy metal glucosides, or other substances with deleterious physiological effects shall not be allowed in the water supply system.

Ordinarily analysis for these substances need be made only semi-annually. If, however, there is some presumption of unfitness because of these elements periodic determination for the element in question should be made more frequently.

[6] When this occurs, and when waters of unknown quality are being examined, simultaneous tests should be made on multiple portions of a geometric series ranging from 100 ml to 1.0 ml or less

4.22. The following chemical substances which may be present in natural or treated waters should preferably not occur in excess of the following concentrations where other more suitable supplies are available in the judgment of the certifying authority. Recommended methods of analysis are given in section 4.3.

Copper (Cu) should not exceed 3.0 p. p. m.

Iron (Fe) and manganese (Mn) together should not exceed 0.3 p. p. m.

Magnesium (Mg) should not exceed 125 p. p. m.

Zinc (Zn) should not exceed 15 p. p. m.

Chloride (Cl) should not exceed 250 p. p. m.

Sulfate (SO_4) should not exceed 250 p. p. m.

Phenolic compounds should not exceed 0.001 p. p. m in terms of phenol.

Total solids should not exceed 500 p. p. m. for a water of good chemical quality. However, if such water is not available, a total solids content of 1,000 p. p. m. may be permitted.

For waters softened by the lime soda process the total alkalinity produced should not exceed the hardness by more than 35 p. p. m. (calculated as $CaCO_3$).

For chemically treated waters the phenolphthalein alkalinity (calculated as $CaCO_3$) should not be greater than 15 p. p. m. plus 0.4 times the total alkalinity. This requirement limits the permissible pH to about 10.6 at 25° C.

For chemically treated waters the normal carbonate alkalinity should not exceed 120 p. p. m. Since the normal alkalinity is a function of the hydrogen ion concentration and the total alkalinity, this requirement may be met by keeping the total alkalinity within the limits suggested when the pH of the water is within the range given. These values apply to water at 25° C.

pH range.	*Limit for total alkalinity (p p m. as $CaCO_3$)*
8. 0 to 9 6	400
9. 7	340
9 8	300
9. 9	260
10. 0	230
10 1	210
10. 2	190
10. 3	180
10. 4	170
10. 5 to 10 6	160

4.3. Recommended methods of analysis:

4.31. Ions with required limits of concentration:

Arsenic (As): Official and Tentative Methods of Analysis. Association of Official Agricultural Chemists, 1940, p. 390; also "Colorimetric Microdetermination of Arsenic," Morris

B. Jacobs and Jack Nagler. Industrial and Engineering Chemistry, Anal. Ed., **14**: 442 (1942).

Fluoride (F): Standard Methods for the Examination of Water and Sewage. American Public Health Association, 1936, p. 36; also Methods of Determining Fluorides, Committee Report, A. P. Black, Chairman. Journal American Water Works Association, **33**:1965–2017 (1941).

Lead (Pb): Standard Methods for the Examination of Water and Sewage. American Public Health Association, 1936, p. 26.

Selenium (Se): Official and Tentative Methods of Analysis. Association of Official Agricultural Chemists, 1940, pp. 11 and 417; also Robinson, W. O., Dudley, H. C., Williams, K. T., and Byers, Horace G.: The Determination of Selenium and Arsenic by Distillation. Industrial and Engineering Chemistry, Anal. Ed., 6:274 (1934).

4.32. Ions and substances with suggested limits of concentration.

Copper (Cu): Standard Methods for the Examination of Water and Sewage. American Public Health Association, 1936, p. 25.

Iron (Fe) and manganese (Mn): Ibid, p. 74 and p. 82.[7]

Magnesium (Mg): Ibid, p. 79.[7]

Zinc (Zn): Ibid, p. 28.[7]

Chloride (Cl): Ibid, p. 34.[7]

Sulfate (SO_4): Ibid, p. 85.[7]

Phenolic compounds: Ibid, p. 245.[7]

With dibromquinonechlorimide as an indicator.

Total solids: Ibid, p. 56.[7]

Alkalinity: Ibid, pp. 59 and 64.[7]

[7] For the chemical determinations referred to in this report, when given, the methods of analysis recommended by the Association of Official Agricultural Chemists are satisfactory and may be substituted for those recommended by the American Public Health Association, which are specifically cited.

MANUAL OF RECOMMENDED WATER SANITATION PRACTICE

(Prepared by Technical Subcommittee)

This manual is not to be considered as part of the Standards which must be met in order to obtain certification of the water supply, but is intended to serve as a guide to the reporting agency.

499125°—43——8

MANUAL OF RECOMMENDED WATER SANITATION PRACTICE ACCOMPANYING UNITED STATES PUBLIC HEALTH SERVICE DRINKING WATER STANDARDS, 1942

INTRODUCTION

In its report accompanying the 1942 Drinking Water Standards the Advisory Committee recommended, as the principal change to be incorporated in the revision, a separation of the text into (*a*) that portion containing the statement of the Standards, and (*b*) that portion which constitutes a recommended manual of water works practice, representing the judgment of the technical subcommittee, composed of officers of the Public Health Service, and which is to serve as a guide to the reporting agency. The Advisory Committee further stated, "This latter portion of the text is not to be considered as part of the Standards which must be met in order to obtain certification of the water supply."

In undertaking the preparation of a manual such as envisioned by the Advisory Committee, the technical subcommittee has recognized that no comprehensive treatise on water supply practice is needed in this connection, in view of the several excellent texts which have been published on this subject, including a recent manual (*1*) issued by the American Water Works Association It considers its task, in fact, to be limited to a comparatively brief and general description of those features of water supply systems and their operation which may be said to conform to accepted principles of good sanitation. It is very largely with these features that the reporting agency is concerned in forming a judgment as to whether or not a particular water supply may meet reasonably acceptable sanitary requirements in respect to its source and protection, as prescribed in section 2 of the Standards. As a further aid to the reporting agency, a section designated as part IV, containing an explanatory discussion of the bacteriological and chemical requirements of the Standards, has been added to this manual. This section is virtually an appendix, as it deals with a subject quite distinct from that of the other sections of the manual.

The main text of the manual, other than part IV, is divided into three sections, parts I, II, and III. In part I are given in outline form those features of water supply systems which may be included in the sanitary survey, including a list of major sanitary defects and health hazards which would be detrimental to the safety of a water supply. In parts II and III are two sections dealing, respectively, with recommended sanitary requirements for water treatment and for water distribution systems. These two parts of the manual are in the form

of a connected discussion, amplifying the outline material given in part I.

In preparing the manual, full advantage has been taken of criticisms of the preliminary text by various members of the Advisory Committee. Although it obviously would be impossible to reconcile fully the conflicting views of any group as large as this committee, an effort has been made to follow, so far as practicable, the concensus of opinion among a majority of the committee. The writers of the manual take this opportunity to acknowledge gratefully the many helpful comments which have been furnished by members of the Advisory Committee on the material herein presented.

In preparing the present manual, cognizance has been taken of the need which exists for affording somewhat greater sanitary protection to certain features of public water supply systems and their operation under the existing wartime conditions than might be considered as essential under those of peace. In general, however, an effort has been made to write the manual from the viewpoint of normal requirements for water sanitation as they would be considered by the reporting agency in connection with the application of the Drinking Water Standards.

Part I

PHYSICAL FEATURES OF WATER SUPPLY SYSTEMS AND THEIR SANITARY PROTECTION

The physical features of water supply systems may be said to include all of those parts which come within the definition given in paragraph 1.6 of the Standards. According to this definition, "a water supply system includes the works and auxiliaries for collection, treatment, and distribution of the water from the source of supply to the free-flowing outlet of the ultimate consumer." Strictly interpreted, sanitary protection would be concerned with all of those parts of a water system which come within this definition, though for practical purposes the attention may be concentrated mainly on those parts which have to do with sources, treatment, and distribution of the water.

A. SCOPE OF REQUISITE INFORMATION AS TO SOURCE AND PROTECTION

In order that the administrative authorities may have the necessary information upon which to base their action, it is required that each water supply coming under consideration should be carefully studied with reference to its source and protection. The precise scope of such a study and of the report thereon will vary according to the circumstances existing in each individual case and cannot be fully

specified in any general terms. The general procedure, however, should be substantially as follows:

1. *A sanitary survey of the water supply should be made by a competent person.* The reliability of the data collected will depend largely upon the competence of the person by whom the survey is made, and the careful selection of personnel for this duty is of primary importance. The qualifications which constitute "competence" cannot be precisely defined, but, in general, the person making the survey should have received a technical education in the basic sanitary sciences equivalent to that given in a course in sanitary engineering in a recognized college of engineering or school of public health; he should have a broad knowledge of the sanitary features and physical facts concerning water supplies for potable use, and he should understand the essential features of water purification plants, their operation and methods of testing.

2. *A brief general description of the water supply should be submitted.* This should include the name of the owner of the supply and a brief description of sources and catchment areas, of the storage available both prior to and following any treatment, and of the plant, with date of installation of main works, and record of subsequent extensions or alterations.

3. *A brief summary of the pertinent facts relating to the sanitary condition of the water supply, as revealed by the field survey, should be submitted.* The following outline will serve to indicate the general scope of the survey. Not all of the items, however, would be pertinent to any one supply, and in some cases items not in the list would be important. Reference should be made to parts II and III of this manual for certain detailed recommendations bearing on various parts of this outline.

(A) SMALL GROUND WATER SUPPLIES

1. Nature of soil and underlying porous strata, whether of clay, sand, or gravel; thickness of water-bearing strata; depth to water table.

2. Nature of rock penetrated, noting especially existence of porous limestone.

3. Depth to strainers; length of strainer; depth of casing; well construction—material—diameter.

4. Slope of water table, preferably as determined from observational wells, or as indicated presumptively but not certainly by slope of ground surface.

5. Nature, distance, and direction of sources of pollution.

6. Possibility of surface drainage water entering the supply, and of wells being flooded by nearby streams.

7. Methods of protection.

8. Pump house construction (floors, drains, etc.); capacity of pumps; draw-down when pumps are in operation.
9. Disinfection: equipment; supervision; laboratory control.

(B) LARGE GROUND WATER SUPPLIES

1. General character of local geology.
2. Extent of drainage area likely to contribute water to the supply.
3. Size and topography of catchment area; slope of ground surface.
4. Nature and porosity of soil and underlying strata, whether clay, sand, gravel, rock (especially limestone); coarseness of sand or gravel; thickness of water-bearing strata.
5. Depth to strainers; length of strainer; depth of casing.
6. Population on the drainage area.
7. Nature, distance, and direction of local sources of pollution.
8. Pump house construction (floors, drains, etc.); capacity of pumps; draw-down when pumps are in operation.
9. Possibility of surface drainage water entering the supply; methods of protection.
10. Methods used for protecting the supply against pollution, by means of sewage treatment, waste disposal, and the like.
11. Protection of collecting well at top and on sides; protection other than check valve or gate against backflow of drain, etc.
12. Availability of an impure emergency supply.
13. Use of tile pipes or other conduits not tight where ground water may be contaminated.
14. Disinfection: equipment; supervision; laboratory control.

Examples of sanitary defects in ground water supplies are:

(1) Caves, sink holes, or abandoned borings used for surface drainage or sewage disposal in vicinity of the source; fissures or open faults in strata overlying water-bearing formations.

(2) Casing of tubular wells leaky, or not extended to sufficient depth, or not extended above ground or floor of pump room, or not closed at top; or casing improperly used as a suction pipe.

(3) Collecting well or reservoir subject to backflow of polluted water through improper drain.

(4) Source of supply or structures subject to flooding.

(5) Leak in systems under vacuum.

(6) Air lift line or lines cross-connected to a sewer or secondary water supply.

(C) SURFACE WATER SUPPLIES, UNFILTERED

1. Nature of surface geology; character of soil and rocks.
2. Character of vegetation, forests, cultivated land, etc.
3. Population and sewered population per square mile of catchment area.

4. Methods of sewage disposal, whether by diversion from watershed or by treatment.

5. Character and efficiency of sewage treatment works on watershed.

6. Proximity of sources of fecal pollution to intake of water supply.

7. Proximity, sources, and character of industrial wastes.

8. Adequacy of supply as to quantity.

9. For lake or reservoir supplies: wind direction and velocity data; drift of pollution; sunshine data (algae).

10. Character and quality of raw water—algae, turbidity, color, coliform (M. P. N.), (average, minimum and maximum).

11. Nominal period of detention in reservoir or storage basin.

12. Probable minimum time required for water to flow from sources of pollution to reservoir and through reservoir to intake.

13. Shape of reservoir, with reference to possible currents of water, induced by wind, from inlet to water supply intake.

14. Measures taken to prevent fishing, boating, landing of airplanes, swimming, wading, ice cutting, permitting animals in or upon the water, etc.

15. Efficiency and constancy of policing.

16. Disinfection of water: Kind and adequacy of equipment, duplication of parts; effectiveness of treatment, adequacy of supervision and laboratory control; contact period after disinfection; whether residual free chlorine or chloramines in chlorinated water; residuals carried.

Examples of sanitary defects are:

(1) Absence or inadequacy of chlorination, or lack of proper control of chlorination; insufficient contact period with chloramines present in treated water.

(2) Insufficient restrictions on recreational use of streams and reservoirs, together with their marginal lands, in the local catchment area.

(3) Existence of sources of pollution, such as population on watershed, lumbering, hunting, and other activities; leaching cesspools, or sewers draining into streams or lakes of the catchment area, or into the marginal lands adjacent to them.

(4) Improper location of intake with respect to bottom of reservoir and current, or to surface drainage water inlets.

(5) Intake exposed and accessible to trespassers.

(6) For lake supplies: Vessels passing near intakes; drift of ice fields; dumping of dredging, garbage, etc., into lake near intakes; inadequate toilet facilities on cribs; nonexamination of employees as carriers of water-borne diseases.

(D) SURFACE WATER SUPPLIES, FILTERED

1. Catchment area: Size, topography; population density (sewered and unsewered); surface geology; reservoirs (capacity and location).

2. Sources of pollution: Nature; distance from intake (miles and time of travel); amounts and distances of sewered population.

3. Sewage treatment on watershed: Extent; methods; populations served; effectiveness and uniformity of results.

4. Raw water characteristics: Turbidity, color, alkalinity, hardness, iron, etc.; bacterial quality (average and ranges); variations in quality, especially after heavy rainfall or at times of high run-off.

5. Rated capacity of filter plant (mgd.): Output (average and maximum daily); maximum capacity of pumps.

6. Coagulant system: Type (solution or dry feeding); chemicals used; dosage rates (average, maximum, and minimum); number and capacity of units; reserve units.

7. Mixing and flocculation basins: Type; flash mixing (average and minimum times); flocculation (average and minimum times); number, size, and arrangement of units; provisions for cleaning.

8. Sedimentation basins (number, size, and retention capacity): Plain sedimentation; post-coagulation sedimentation; methods of cleaning; flexibility of operation; efficiency of turbidity and bacterial removal.

9. Filters: Type (pressure or gravity); number; sizes and rated capacities (net filtering area); effective size and uniformity coefficient of sand; washing system (direct or from storage, rates of wash water application); loss-of-head gages; rate controllers (average and maximum rates of filtration).

10. Filtered water storage: Capacity; location, arrangement; covered or uncovered; protection against contamination; methods of cleaning; added storage in distribution system.

11. Aeration: Kind, purpose, capacity, location in purification system; efficiency.

12. Disinfection: Kind, stages (if more than one); location in purification system; capacity; method of operation; operation control; average, maximum and minimum dosage; chlorine—ammonia ratios (if ammonia used); simple or "break-point" chlorination (if used); efficiency of each stage.

13. Plant operation and control: Technical supervision (trained or untrained, full-time or part-time); number of operators; laboratory control (kind and frequency of tests); plant and laboratory records (kind, extent, use, etc.); meteorological records.

Examples of sanitary defects are:

(1) Excessive raw water pollution in relation to extent of treatment

provided (see part II, A, (1)); existence of nearby uncontrolled sources of raw water pollution.

(2) By-pass connections for raw water or partially treated water, whereby insufficiently purified water may be discharged into the distribution system.

(3) Existence of cross-connections within the plant, between conduits or basins carrying untreated or partly treated water and those containing completely treated water.

(4) Deficient output capacity of treatment works, necessitating excessive overloading or occasional by-passing of units.

(5) Lack of competent supervision and operation, or of adequate laboratory control.

(6) Deficient or inaccurate operation or laboratory records.

(7) Lack of suitable devices for measuring and recording volumes of water treated; for maintaining continuity of coagulant and chlorine dosage; deficient retention periods in settling basins; or inadequate areas, depths, sizes of sand or washing facilities for filters.

(8) Lack or deficiency in proper chlorination equipment and control, or failure to maintain proper chlorine residuals in the treated effluent at all times.

(9) Lack of suitable protection for purified water; storage capacity less than requirements for safety.

(E) PUMPING STATION AND COLLECTING SYSTEM

1. Number, type, and capacity of pumps, including reserve; condition of equipment and method of operation; condition of suction pipes.
2. Emergency intakes.
3. Emergency supply of power; record of power shut-down; effect of shut-down on surges through conduits, etc.
4. Recording apparatus on suction well elevation; rise and fall of suction well elevation.
5. Screens for fish and debris.
6. All sewers cast iron, or otherwise.
7. Curb walls around wells to protect against surface drainage.
8. Continuous or intermittent operation.

Examples of sanitary defects are:

(1) Leaky suction pipes.

(2) Pump not self-priming; unsafe water used for priming.

(3) Suction well or suction pipes unprotected from surface or subsurface pollution.

(4) Suction well subject to pollution through backflow of polluted water through drain.

(5) Improper location or inadequate protection with reference to flood waters.

(6) Lack of suitable provision for insuring continuity of pumping service under all possible conditions.

(F) DISTRIBUTION SYSTEM

1. Area and population supplied (proportion to total within corporate limits).

2. Type of distribution system; whether by gravity, direct pumping, indirect pumping, etc.

3. Use, location, and capacity of reservoirs and standpipes.

4. Adequacy of distribution system with respect to area served, sizes of mains and laterals, circulation of water, storage provided, etc.

Examples of sanitary defects are:

(1) Existence of cross-connections between primary supply and secondary supply of questionable safety at any point in the distribution system.

(2) Return to the system of any water used for cooling; hydraulic operations, etc.

(3) Absence, or inadequate protection, or improper location of distribution reservoirs, standpipes, or elevated pressure tanks.

(4) Intermittent service, resulting in reduced or negative pressures in distribution system; sizes of mains and laterals inadequate for preventing negative pressures; presence of dead ends permitting reduced or negative pressures.

(5) Connections to sprinkler systems using toxic solutions as anti-freeze.

(6) Repumping on consumer premises when pressure is low (causing negative head).

(7) Connection to sewers and sewer-flushing chambers, and improperly located blow-offs in distribution system.

(8) Lack of check valves on consumer services to prevent back-flow (especially from high building storage tanks), or from ammonia systems at ice plants, or from hot water systems.

(9) Existence of hydrant wash lines connected to sewer.

(10) Presence of a secondary water system on premises where public system exists.

(11) Lack of suitable plumbing ordinances prohibiting the use of backflowing toilet or sink fixtures, or permitting the use of storage tanks connected directly to sanitary fixtures without proper vacuum breaker inlets, or permitting unsafe cross-connections between potable and nonpotable water supplies in private premises.

(12) New connections of pipe line joined to the system without prior disinfection of pipes.

(13) Existence of tile or other leaky pipes in distribution system

(14) Improper location of water pipes in relation to sewers and storm water drains.

Part II

RECOMMENDED SANITARY REQUIREMENTS FOR WATER TREATMENT SYSTEMS

A. GENERAL REQUIREMENTS

(1) EXTENT OF TREATMENT

(*a*) For purposes of classification with respect to treatment requirements, waters acceptable for treatment may be divided into the following groups:

Group 1. *Waters requiring no treatment.*—This group would be limited to underground waters subject to no possibility of contamination and meeting in all respects the requirements of these Standards, as shown by regular and frequent sanitary inspections and laboratory tests.

Group 2. *Waters requiring simple chlorination, or its equivalent.*—This group would include both underground and surface waters, subject to a low degree of contamination and meeting the requirements of these Standards in all respects except as to coliform bacterial content, which should average not more than 50 per 100 ml. in any month.

Group 3. *Waters requiring complete rapid-sand filtration treatment, or its equivalent, together with continuous postchlorination.*—This group would include all waters requiring filtration treatment for turbidity and color removal, waters of high or variable chlorine demand, and waters polluted by sewage to an extent such as to be inadmissible to groups 1 and 2, but containing numbers of coliform bacteria averaging not more than 5,000 per 100 ml. in any month and exceeding this number in not more than twenty (20) percent of the samples examined in any month.

Group 4. *Waters requiring auxiliary treatment in addition to complete filtration treatment and postchlorination.*—This group would include waters meeting the requirements of group 3 with respect to limiting monthly average coliform numbers, but showing numbers exceeding 5,000 per 100 ml. in more than twenty (20) percent of the samples examined during any month and not exceeding 20,000 per 100 ml. in more than five (5) percent of the samples examined during any month.

Note.—By "auxiliary treatment" is meant presedimentation or prechlorination, or their equivalents, either separately or combined, as may be necessary. Long-time storage, for periods of 30 days or more, represents a permanent and reliable safeguard which in many

cases would provide something more than an effective substitute for one or both of the two other methods indicated.

Remarks.—(*a*) Although group 1 conceivably might include exceptional surface waters free of any possible contamination and further protected by storage, it hardly can be considered as a safe general rule to admit any surface water to a public supply without chlorination as a minimum safeguarding treatment, in view of the present increased hazards of chance contamination resulting from the extension of recreational and migratory travel to many hitherto inaccessible places. Under wartime conditions, additional need would exist for extreme precaution in this respect.

(*b*) The limiting monthly average coliform numbers stated for waters of groups 2 and 3 are intended as guides rather than inflexible rules, though they are based on extensive observational data (*2*) fairly representing present water treatment practice in this country. Certain recent improvements in water chlorination and its control offer promise of increasing the margin of safety of water purification efficiency, with respect to bacterial removal. These improvements have not, however, become fully incorporated into general practice throughout the country, nor does it appear desirable that they should be regarded as warranting any relaxation in the requirements for raw water quality which experience and present standards of safety would indicate as being necessary for providing adequate protection to sources of water supply in general.

(*c*) For waters of group 4, which differ from those of group 3 only in respect to variability, auxiliary treatment is intended mainly as a factor of safety in controlling variations in coliform numbers within the range of 5,000 to 20,000 per 100 ml. The larger of these two figures represents the maximum safe limit for prechlorination, or its equivalent, in addition to filtration treatment and postchlorination.

(*d*) Waters failing to meet the requirements of groups 1, 2, 3, or 4 would be considered as unsuitable for use as a source of water supply, unless they could be brought into conformance with these requirements by means of prolonged preliminary storage, or some other measure of equal permanence and reliability.

(2) OTHER RAW WATER REQUIREMENTS

In addition to meeting the aforesaid bacterial requirements, waters acceptable for treatment should not contain any toxic or otherwise harmful substances, or organisms not readily and completely removable by ordinary water treatment. Raw waters should be free of excessive amounts of acid, microscopic organisms, or organic matters causing any interference with the normal operation and efficiency of water treatment processes.

B. DESIGN AND CONSTRUCTION

In general, the design and construction of individual water treatment plants will vary with local circumstances and should be in accordance with the results of experiments on the water to be treated. The following recommendations, therefore, are intended only as a general guide to good practice and are to be interpreted somewhat broadly in the light of the particular raw water characteristics and other conditions which may be involved in a given situation.

(1) PLANT DELIVERY CAPACITY

The delivery capacity of a treatment plant, including filtered water storage at the plant, should always be in excess of the maximum expected draft on any day of the year. The excess of provided capacity over average daily draft may vary from 50 to 100 percent and normally should be at least 50 percent.

(2) PLANT LOCATION

The treatment plant, including raw water and effluent pumps, should be located at an elevation sufficiently high above surrounding bodies of water and have sufficient auxiliary power to insure continuance of operation under all circumstances, including floods. If located in a valley, the site should be adequately drained so that no surface water can gain access to wells, basins, filter tanks or other units. The plant should be located so that no conduit, basin, or other structure containing or conducting water in the process of treatment can possibly be affected by leakage from any sewer, drain, or other source of contamination.

(3) PRESETTLING RESERVOIRS

Presettling reservoirs should be located above the influence of flood waters. They should be at least two in number, so as to permit continuous operation under all circumstances, and should be of sufficient capacity to afford a nominal retention period of at least 1 day and preferably 2 or 3 days. Provision should be made for rapid and convenient removal of sludge from the reservoirs. In the treatment of highly polluted waters of variable quality, provision should be made for coagulation at the inlet and for prechlorination at the inlet or the outlet of the reservoirs, whenever such measures may be necessary. Reservoirs should be provided with boats and life preservers for the protection of employees.

(4) COAGULATION-SEDIMENTATION BASINS

In order to insure continuous operation, basins for flocculation and sedimentation of coagulated waters should be at least two in number,

should be designed for series or parallel operation, and preferably should provide a total retention period of at least 5 or 6 hours, except where the use of preliminary mixing and flocculating devices and continuous sludge removal permit somewhat lower periods with unimpaired efficiency. Inlets and outlets of ordinary straight-flow basins should be at opposite ends of the basins and, if necessary, should be provided with baffles so located as to prevent short circuiting. Similar baffles may be advantageously installed in the settling compartment. The maximum velocity of flow in the settling compartment should not exceed that which usually is provided in well-designed basins of this type. The length of settling compartments in such basins, if rectangular, should be preferably at least twice the width. Stilling compartments should be provided at basin inlets. If stream use will permit, sludge drains may discharge at points located well downstream from the intake, or intakes, at points removed from the influence of cross-currents passing the intake. Otherwise, suitable sludge disposal areas should be provided. The depth of basins should be such as to maintain proper velocity of flow and sludge removal, the permissible depth being slightly lower with continuous sludge removal. Flow line elevations should not vary more than a few inches above or below the normal level.

Flash mixing and flocculation tanks.—Preliminary flash mixing and flocculating equipment, capable of adequate flexibility of adjustment to provide optimum flocculation under varying raw water conditions, is a highly desirable feature of well-designed modern filtration plants and should be credited as a distinct addition to the sanitary protection afforded by a purification system. An ideal combination of flash mixing and flocculation would provide about 1 t · 2 minutes of violent agitation followed by about 20 to 30 minutes of slow mixing to promote flocculation.

(5) COAGULANT SYSTEM

Rapid-sand filtration plants should be provided with efficient modern devices for measuring and adding coagulants to the water under treatment. All chemical dosing equipment, whether of the dry-feed or solution-feed type, should have at least one unit in reserve throughout and should be provided with effective recording and alarm devices to insure continuity of service at all times. An accurate flow meter should be provided for the water treated and also for dry-feed equipment, suitable gravimetric devices for measuring the amount of chemicals added from hour to hour. All chemical feed equipment should be capable of ready adjustment to variations in the flow of water being treated.

(6) FILTERS

Slow-sand.—Slow-sand filters, if properly designed and operated, are applicable to the treatment of certain types of relatively clear waters. They preferably should be covered, should be provided with loss-of-head gages, should have a sand depth of 36 to 40 inches, and should never be operated with less than 20 inches of depth. The sand should have an effective size of 0.25 to 0.35 mm. and should be operated at rates of about 2.5 million gallons per acre daily. In operating slow-sand filters, care should be taken to avoid any sudden increases in the rate of filtration.

Rapid-sand.—Rapid-sand filters should be preferably of the gravity type, in order to permit ready and continuous inspection. The depth, effective size, and uniformity of sand should be in accordance with the requirements of adequate yield and filter efficiency. Ordinarily, sand depths of about 30 inches are customary, with effective sand size ranging from 0.40 to 0.50 mm. and uniformity coefficient from 1.5 to 2.0. The rate of filtration should conform to established practice, preferably not exceeding 3 gallons per minute per square foot of filtering area.

In general, rapid-sand filters should be designed and operated with a view to maintaining reasonably high efficiency of bacterial removal, and the filtering medium should be in good condition, free of mud balls, cracks, and other hindrances to efficient filtration. Efficient loss-of-head gages, rate controllers, and other essential control devices should be provided.

(7) FILTERED WATER STORAGE RESERVOIRS

Filtered water reservoirs at the plant preferably should be covered and located near to, but physically separated from, the plant. Where located below filters, adequate protection against leakage of drainage water from other parts of the plant into the reservoirs should be provided. Trap doors and inspection openings should be properly sealed and locked. Suitable vents, protected against outside contamination, should be provided. All effluent pipes should be properly sealed against leakage and tested by frequent inspections. Filtered water reservoirs should be thoroughly tight against external leakage, should be situated above the ground water table, and preferably should have no walls in common with any other plant units containing water in the process of treatment.

(8) INTERCONNECTIONS, CROSS-CONNECTIONS, OPEN CONNECTIONS, AND PARTITION WALLS

(*a*) No cross-connection or interconnection should be permitted to exist in a filtration plant between any conduit carrying filtered or

postchlorinated water and another conduit carrying raw water or water in any prior stage of treatment.

(*b*) No conduit or basin containing finished water should be permitted to have a common division wall with another conduit or basin containing raw water or water in any prior stage of treatment.

(*c*) Rewash or filter-to-waste conduits should not be directly connected to any drainage conduit, but should be protected by a suitable one-way gap-delivery connection, so that no back-siphonage can occur under any condition.

(*d*) No conduit carrying raw water or any water in a prior stage of treatment should be located directly above another conduit carrying finished water, with a single common partition between them. This rule is not strictly applicable, however, to cast-iron pipes with tight joints carried in the open and readily accessible for inspection and repair.

(9) DRAINS

All drainage conduits should be constructed so as to be thoroughly tight against external leakage. They should discharge at points in a river or lake so located that no currents of water can under any circumstances be carried from a drain outlet to the plant intake, or to any other water intake located in the vicinity of the plant. No domestic or other sewer should be permitted to be discharged into the river or lake in the vicinity of a treatment plant intake, or directly above such intake, nor should any drain carrying contaminated surface water be permitted to be discharged likewise.

(10) CHLORINATION

(*a*) *General.*

Chlorination equipment should be selected, installed, and operated so that continuous and effective disinfection is secured under the required local conditions.

(*b*) *Chlorination equipment.*

1. Chlorination equipment should have a maximum capacity at least 50 percent greater than the highest expected dosage to be applied at any time. It should be capable of satisfactory operation under every prevailing hydraulic condition at the plant.

2. Automatic proportioning of the chlorine dosage to the rate of flow of the water treated should be provided at the larger plants and at all plants where the rate of flow varies more than 50 percent above or below the average flow. Manual control should be permissible only where the rate of flow is relatively constant and an attendant is always at hand to effect promptly the necessary adjustments in dosage.

3. All clorination equipment should be installed in duplicate, so as to provide stand-by units for insuring uninterrupted operation

Duplicate units should be operated frequently to insure workability. A complete stock of spare parts and tools should be maintained for emergency replacements or repairs.

4. A reliable and uninterrupted supply of water, free of coarse suspended matter, should be available under adequate pressure to insure the continuous operation of solution-feed chlorinators. Hydraulically or electrically driven pumping equipment, if used for maintaining such pressure, should be provided with alternative sources of power where necessary to insure continuous operation.

5. Scales, preferably of the indicating and recording type, should be provided for weighing the cylinders of chlorine and checking the losses in weight of chlorine as fed from the cylinders during successive intervals of time. These scales should be sufficiently accurate and sensitive to measure such losses with suitable precision.

6. A sufficient number of cylinders of chlorine should be connected to the chlorinator in use so that adequate operating pressures will be maintained at various temperatures.

(c) *Hypochlorite solutions.*

1. Solutions of calcium or sodium hypochlorite should be prepared in a separate mixing tank, then diluted and allowed to settle, so that only a clear supernatant liquid is withdrawn to the solution storage tank and to the chlorinator.

2. The strength of stored calcium hypochlorite solutions should be checked frequently by laboratory test in order to ascertain that no loss of strength has occurred. Calcium hypochlorite solutions should be prepared freshly every 4 or 5 days, unless properly alkalinized with sodium carbonate.

(d) *Safety requirements.*

1. Suitable gas masks and a small bottle of ammonia for testing for leaks should be kept at convenient points immediately outside the room or enclosures in which chlorine is being stored or is in use. Gas masks should be inspected at regular intervals and kept in serviceable condition.

2. Chlorinating equipment and cylinders of chlorine should be housed preferably in separate buildings above the ground level, as a measure of safety.

3. The room or building housing chlorinators in service should be maintained at a temperature of above 60° F., but never in excess of the normal summer temperature. The cylinders of chlorine should be shielded, where necessary, from excessive heat or cold. Direct heat should not be applied to cylinders of chlorine, nor should hot water be poured over them or come in contact with the cylinder valve.

4. Adequate ventilation should be provided for all enclosures in which chlorine is being fed or stored.

5. All joints of tubing connecting chlorine cylinders and chlorinators should be kept absolutely tight and inspected frequently to insure tightness. Tubing should slope upward from the cylinders.

(*e*) *Control of chlorination.*

1. Chlorine should be applied continuously to the filtered effluent at a point where thorough and rapid mixing with the treated water will be effected. Free active chlorine should be in contact with the treated water for not less than 20 minutes, or chloramine preferably for at least 3 hours, before the treated water reaches the first consumer.

2. The proper dosage of chlorine will be determined by regular and frequent routine bacteriological and residual chlorine tests, both at the plant and at various points in the distribution system. In general, a safe desirable minimum of residual free chlorine at distant points in the distribution system would be 0.05 or 0.10 p. p. m., depending on circumstances. For chloramines, the desirable residual would be somewhat higher. The residual carried in the finished water as delivered from the treatment plant should be regulated accordingly. At times of threatened or prevalent outbreaks of water-borne disease, the residual chlorine should be increased preferably to a minimum of 0.2 or 0.3 p. p. m. in all parts of the distribution system, if possible, regardless of tastes or odors in the delivered water. Similar measures should be taken in the event of any lapse in the normal efficiency of the treatment plant.

3. Routine sampling points should be maintained at the treatment plant and at several vital points in the water distribution system. Sample collections should be made regularly at the latter points and the samples tested bacteriologically and for residual chlorine. Chlorine demand tests should be made occasionally on samples collected in the distribution system for comparison with the results of similar tests at the treatment plant. Any abnormal increase in the chlorine demand, or decrease in the residual chlorine at any point in the distribution system, should be checked and, if consistently observed, followed up by a thorough physical investigation of that portion of the system.

4. The tests for residual chlorine should be made in accordance with the eighth edition of the "Standard Methods for the Examination of Water and Sewage, 1936" published jointly by the American Public Health Association and the American Water Works Association This test should be made at least once during each successive period of 8 hours every day in the finished water at the treatment plant and at least three times weekly at regular sampling points in the distribution system.

5. Special care should be taken to maintain a detailed and accurate record of chlorination and the results thereof. Such a record should

show: rate of flow of water treated, gross weight of chlorine cylinder in use, weight of chlorine used for 24 hours, setting of chlorinator, and time of making and results of residual chlorine test.

6. Unless bacteriological and other tests should indicate the need of maintaining higher minimum concentrations of residual chlorine, at least 0.2 p. p. m. of free chlorine should be maintained in the treated water after a contact period of at least 10 minutes. When chloramine treatment is used for disinfection, the residual chlorine concentration, as indicated by the orthotolidine reagent, should be at least 0.4 p. p. m. after 2 hours of contact. Where "break-point" chlorination is practiced, a sufficient concentration of residual free chlorine should be maintained at the treatment plant so that it will be not less than 0.05 to 0.10 p. p. m. at all points in the distribution system. When required in specific instances, the minimum concentration of residual chlorine and the minimum retention period for the chlorinated water should be increased as directed by the State Department of Health.

7. Results of recent studies have indicated that the product of required concentration and period of contact of chloramine with water may range from 20 to 30 times the corresponding product for free active chlorine, in order to obtain comparable bactericidal action. The required dosage can be determined by means of "breakpoint" tests of the water and adjustment of the chlorine dosage so as to allow for some absorption of free chlorine in the distribution system initially. This absorption should diminish after the chlorine demand of organic matter remaining in the system has been satisfied.

C. OPERATION CONTROL

(1) SUPERVISION

Every water treatment plant engaged in purifying water for domestic use should be under the charge of a technically trained supervisor. For plants treating variable or highly polluted raw waters, trained supervision should be continuous and full-time. For certain types of small plants, part-time trained supervision may be practicable under favorable circumstances. Under these conditions, the supervisor should be in constant touch with the plant attendants and available on call in any emergency, and should visit the plant at least twice each week.

(2) LABORATORY TESTS AND CONTROL

(*a*) The schedule of laboratory tests followed in controlling the operation of a water treatment plant will vary with the size of the plant and character of water treated, though certain minimum requirements

may be stated. For the ordinary plant, the minimum schedule of laboratory tests should include determinations of air and water temperature, turbidity or color (or both), alkalinity, pH value, hardness, residual chlorine, bacterial count at 20° C. or 37° C. (or both), and coliform bacterial numbers, both presumptive and confirmed. Where "break-point" chlorination is practiced, a continuous record of free ammonia in the water to be chlorinated should be maintained. Occasionally special tests may be necessary, such as for residual alum, iron, manganese, or other undesirable constituents of the final effluent. Where prechlorination is used in addition to post-chlorination, tests for residual chlorine should be made at each major stage of treatment and, in the raw water, tests for chlorine demand.

(*b*) For operation control at the plant, the frequency of tests, particularly for turbidity, residual chlorine, bacterial count, and coliform organisms, though dependent on the character of water treated and on its variability, should be such that at least one test each 24 hours and every day of the week will be carried out. For the larger plants, at least three sets of samples are usually collected daily for bacteriological tests. Determinations of turbidity and residual chlorine are made more frequently, sometimes at hourly intervals when the character of the raw or partly treated water is changing rapidly.[1]

(*c*) An important though somewhat less tangible element in judging the efficiency of plant operation is the general appearance of the plant and its surroundings. A neat, well-kept plant with attractive grounds is almost invariably an index of efficient operation, though, in some of the smaller plants especially, this criterion may not always be infallible. Mere neatness in the external maintenance of a plant, however, cannot offset lack of proper training on the part of the operator.

In rating the general efficiency of operation control, the following items are of primary importance:

(1) Training and experience of supervisor and operating staff.

(2) Adequacy of operation records.

(3) Efficiency of laboratory control.

(4) Suitability of plant design and construction to the character and pollution of the raw water.

(5) Capacity of the plant in relation to the average and maximum required output.

---

[1] The following rule, wholly arbitrary, would give sampling frequencies depending in part on the daily volume of water treated and on the density of raw water pollution

$$N=\sqrt[3]{VC}$$

where N=number of samples per 24 hours,
V=volume of water treated in million gallons daily,
C=coliform number, M. P. N., in thousands per 100 ml.

According to this rule, the number of samples per 24 hours would range from 1 to 2 for a 1 mgd. plant with raw water coliforms 1 to 5 thousands per 100 ml. and from 5 to 8 for a 100 mgd. plant with the same range in coliform numbers.

Part III

RECOMMENDED GENERAL SANITARY REQUIREMENTS FOR WATER DISTRIBUTION SYSTEMS

A. GENERAL

1. A water distribution system should be designed and constructed so as to provide at all times an adequate supply of water at ample pressure in all parts of the system.

2. The safety and palatability of the water should not be impaired in any manner while flowing through the distribution system, or any part thereof.

3. The system should be provided with sufficient valves and blow-offs so that necessary repairs can be made without undue interruption of service over any considerable area.

4. No unprotected open reservoir, or physical cross-connection whereby unsafe water can enter the distribution system, should be permitted.

5. The system should be tight against excessive leakage and its various mains and branches should be separated from rivers and other possible sources of contamination.

6. The system should be designed so as to afford effective circulation of water, with a minimum of dead ends.

7. The distribution system should be maintained in a sanitary manner, with due precautions against contamination of the water in any part of it as the result of necessary repairs, replacements, or extension of mains.

8. Frequent and regular bacteriological examinations should be made of water samples collected at various control points in the distribution system, with an immediate and thorough checking of any unusual results.

B. PIPING SYSTEM

1. The water mains should be of adequate size so that negative pressure will not occur under any condition of draft on the system.

2. Joints should be of such design and should be installed so as to show no leakage under a standard pressure test before covering. Materials used for caulking should be of a character such as not to foster the growth of coliform bacteria.

3. Corrective water treatment should be instituted where deposits in the mains tend to reduce the effective size and capacity of the pipes. For biological deposits, heavy chlorination may be effective.

4. The piping system should be designed so as to maintain an adequate positive pressure of water in all parts of the system, regardless of unusual drafts on any parts of the system. Pressure-equalizing

standpipes or reservoirs should be located at suitably distant points from the pumping or main supply station.

5. Where dead ends are necessary as a stage in the growth of the system, they should be located and arranged with a view to connecting them ultimately so as to provide circulation.

6. Water pipes should be laid, so far as possible, above the elevation of nearby sewers and at least 10 feet laterally from them. Where this requirement cannot be met because of physical conditions, extra precautions should be taken in securing absolute and permanent tightness of water pipe joints.

7. Where a water service pipe crosses a street sewer at less than 6 feet vertically above the sewer, or is within 10 feet of it horizontally, all of that part of the water pipe lying within these distances should be constructed preferably of copper or brass pipe connected to the iron pipe with a brass fitting. In such cases it is preferable to use copper or brass pipe from the water main to the house, and the house sewers should be constructed of extra heavy cast iron with water tight joints. Where priorities necessitate the use of materials other than brass or copper, extra-heavy iron pipe should be used under these conditions.

8. Sanitary precautions should be taken in laying new water pipes. Where avoidable, pipe should not be laid in water or where it can be flooded with water or sewage in laying. Leakage tests should be made by means of hydrostatic pressure. New mains should be kept filled with a strong hypochlorite or chlorine solution (40–60 p. p. m. of chlorine) for at least 24 hours and then drained before being placed in service. Fire hydrants should not be drained into the sewers or storm drains. Valve chambers should be of watertight construction and should not be connected directly to a storm or sanitary sewer.

C. CROSS AND OPEN CONNECTIONS

1. In general, no physical cross-connection should be permitted between a public or private water distribution system containing potable water and any other system containing water of questionable safety.

2. Open connections, physically separated, may be permissible under regulation and supervision by the local or State health department.

3. House or industrial toilet or sink fixtures capable of back-siphonage into the water system should be classed as cross-connections and should be prohibited, except where supplied by an independent elevated storage tank physically separated from the water supply pipes and protected by an approved siphon-breaker inlet. Dual water systems should be avoided where possible.

Part IV

A. Discussion of Chemical Requirements for the Revised Drinking Water Standards

It is fairly obvious that a water which is turbid, or colored to a degree which is easily noticeable, or which has an unpleasant or unusual odor or taste, will be looked upon with suspicion by the consumers to whom it is served for drinking purposes. For this reason its use should not be permitted where clarification of the water is practicable, or where a more acceptable supply is available.

The presence of considerable amounts of calcium and magnesium salts makes the water unsuitable to use for washing, and it is also unpleasant for drinking to persons who have been accustomed to softer water, but persons who are accustomed to the harder waters may find the softer waters less agreeable to their taste. Although it is open to question whether it would be justifiable to require the dilution of hard water by distilled water in order to keep within the limits specified in the Standards, it would be proper to require carriers to select the local supplies which most nearly fulfill the requirements of the Standards with respect to mineral content.

Insofar as the chemical composition of the water may cause inconvenience by its irritating effect upon the intestinal canal, or by any more serious effect upon well-being, the certifying authority will be justified in requiring that due regard be paid to this matter by common carriers. Unfortunately, it is difficult to secure reliable information concerning the physiological activity of salts as found in waters. Idiosyncracy is important. It is universally admitted that poisonous or otherwise harmful elements or salts in significant quantities, such as lead, hexavalent chromium, arsenic, fluoride or selenium, should not be allowed in water for drinking or culinary purposes. It is difficult, however, to fix limits for the less poisonous substances or salts which are normally present. The effect of sulfates, and especially of magnesium sulfate, is, however, well recognized, and it would be desirable to avoid the use of waters in which the concentration of these salts is sufficiently high to be annoying. The use of salts of barium or of hexavalent chromium for treating the water or water system should not be allowed on a drinking water supply. Molecularly dehydrated phosphates have come into use for water treatment but sufficient information upon the physiological effects of small amounts of these salts is not available. Consequently, their use in excess of 10.0 p. p. m. for treating any drinking water should be avoided. When waters are treated with chemicals in order to soften or to purify them, it is desirable that any excess use of the chemical be avoided. Limits for alkalinity resulting from excess lime or other softening procedures already have been suggested. More than a small

amount of free chlorine (1.0 p. p. m.) or chloramine (2.0 p. p. m.) is objectionable in the effluent from a treatment plant because of resulting chlorinous taste in the water. In general, it is considered proper to insist that effort be made to find waters which are as satisfactory as possible from the standpoint of chemical characteristics, but with due regard to the region within which the water supply must be obtained.

Relation between pH, total alkalinity, hydroxide, carbonate and bicarbonate alkalinities in waters.—In the chemical analyses of water, it is often desirable to know the concentrations of hydroxide, carbonate and bicarbonate alkalinities present in the sample, as well as the total alkalinity to methyl orange. At present, according to Standard Methods (*3*), the OH^-, $CO^=_3$, and HCO^-_3 components of a total alkalinity are calculated from the values for the methyl orange (T) and phenolphthalein (P) alkalinities by means of the relations given in part II, section VI, paragraph 3.1 (p. 66). Experimentally, the phenolphthalein titration of samples containing carbon dioxide and mixed carbonates is far from satisfactory. Furthermore, the formulae for calculating the amounts of OH^-, $CO^=_3$, and HCO^-_3 alkalinity from the values of P and T ignore the laws of chemical equilibrium. The formulae assume that neither OH^- and HCO^-_3 nor $CO^=_3$ and CO_2 may exist in the same solution, assumptions which are quantitatively incorrect. Also the formulae give values for OH^- which too often do not check with those calculated from the pH of the water.

On the basis of the ionization equilibria of carbonates and water, DeMartini (*4*) formulated equations by means of which the concentrations of CO_2, HCO^-_3, $CO^=_3$, and OH^- present in a given sample can be calculated from the values for pH and total alkalinity. Moore (*5*), using the best available values for the ionization constants of carbonic acid and water, presents the DeMartini equations as follows:

(1) OH^- (in terms of $CaCO_3$) $=\dfrac{5\times10^{-10}}{(H^+)}$

(2) $CO^=_3$ (in terms of $CaCO_3$) $=\dfrac{5.61\times10^{-6}}{(H^+)}\times A$

(3) HCO^-_3 (in terms of $CaCO_3$) $=50{,}000\times A$

(4) CO_2 (as CO_2) $=9.70\times10^{10}\times(H^+)\times A$

Where A is the factor $\dfrac{\dfrac{T}{50{,}000}+(H^+)-\dfrac{10^{-14}}{(H^+)}}{1-\dfrac{11.22\times10^{-11}}{(H^+)}}$

in which T stands for total alkalinity and (H^+) represents the hydrogen ion concentration and is related to pH by the expression $pH=\log\dfrac{1}{(H^+)}$.

The total alkalinity is an equilibrium mixture of its OH^-, $CO^=_3$, and HCO^-_3 components. If the amounts of OH^-, $CO^=_3$, and HCO^-_3 in a

given alkalinity are expressed in terms of percentage of the total alkalinity, any given equilibrium mixture can be represented by a point on a triangular coordinate diagram. The triangular diagram has for its three coordinates the percent fractions of each of the three alkalinity components, OH^-, $CO^=_3$, and HCO^-_3. These vary from

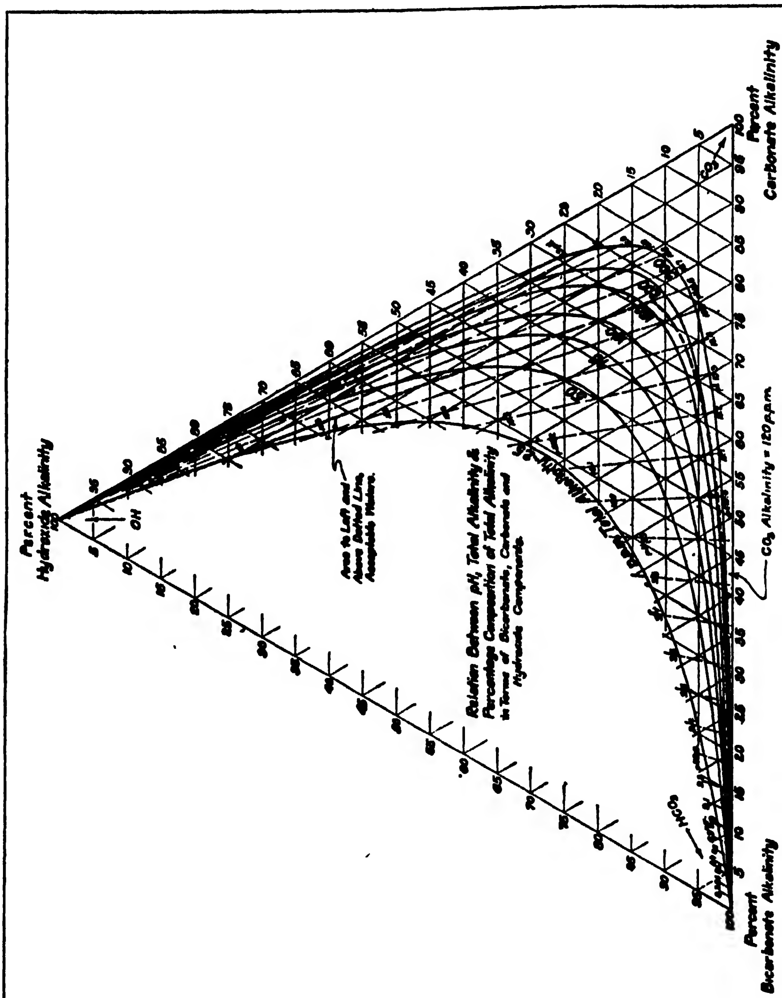


FIGURE 2.—Relation between pH, total alkalinity, and percentage composition of total alkalinity.

0 percent at the three sides of the triangle to 100 percent at the opposite apex.

Using Moore's equations, the amounts of OH^-, $CO^=_3$, and HCO^-_3 in equilibrium with each other at pH values ranging from 7.0 to 11.6 for alkalinity values of 25, 50, 75, 100, 150, 200, and 300 p. p. m. were calculated, converted to the percent fraction basis and plotted on the

triangular diagram. The curves show how the relative proportions of OH^-, $CO^=_3$, and HCO^-_3 for any given alkalinity change with pH. In the diagram there are presented curves for waters with total alkalinities of 25, 50, 75, 100, 150, 200, and 300 p. p. m. (heavy solid line curves). The thin lines running from the base of the triangle to the opposite apex (100 percent OH^-) represent samples of any given pH and show how for any given pH the relative amounts of OH^-, $CO^=_3$, and HCO^-_3 will vary with total alkalinity.

The proposed Standards set the following limits: (1) the water shall not have a pH greater than 10.6, and (2) the carbonate ($CO^=_3$) alkalinity shall not exceed 120 p. p. m. The thick broken lines represent these limits. All samples whose compositions are represented by points to the left of the 10.6 pH tie-line and above the 120 p. p. m. $CO^=_3$ line are acceptable. All samples of composition represented by points to the right of and below the limiting lines are to be rejected.

Because chemical equilibria are affected by change in temperature and by changes in the ionic strength of the solution, Moore's equations are strictly valid only for waters at 25° C. and low dissolved solids concentration. (Ionic strength is more or less proportional to dissolved solids concentration.) However, for practical purposes the equations will hold quite accurately for all pH values up to 10.0 in waters containing up to 500 p. p. m. dissolved solids at temperatures from 15° to 25° C.

B. Discussion of Bacteriological Requirements for the Revised Drinking Water Standards

The bacteriological examinations which have come to be recognized generally as of most value in the sanitary examination of water supplies are:

(1) The count of total colonies developing from measured portions planted in agar or gelatin plates and incubated for 48 hours at 20° C.

(2) A similar count of total colonies developing on agar plates incubated for 24 hours at 37° C.

(3) The quantitative estimation of organisms of the coliform group by applying specific tests to multiple portions of measured volume.

Of these three determinations, the test for organisms of the coliform group is almost universally conceded to be the most significant because it affords the most nearly specific test for the presence of fecal contamination. Only this test has been included, therefore, in the bacteriological standard recommended, as neither the 37° C. nor the 20° C. plate count would appear to add information of sufficient importance, for the purpose of these Standards, to warrant their inclusion in the required examination. The omission of plate counts

from the Standards is not to be construed, however, as denying or minimizing their importance in routine examinations made in connection with the control of water purification processes.

For the purposes of the Standards the coliform group is defined as including all organisms considered in the coli-aerogenes group as set forth in Standard Methods for the Examination of Water and Sewage, eighth edition (1936), as prepared, approved, and published jointly by the American Public Health Association and the American Water Works Association, New York City.

In accordance with this definition, the Standard provides that the procedure required for demonstration of the coliform group be as prescribed in Standard Methods, eighth edition, 1936, referred to above, for the tests designated:

(*a*) The completed test, or

(*b*) The confirmed test, when a liquid confirmatory medium (brilliant green lactose bile broth, 2 percent) is used, provided the formation of gas in any amount in this medium during 48 hours of incubation at 37° C. is considered to constitute a positive confirmed test, or

(*c*) The confirmed test where (1) crystal violet lactose broth, (2) fuchsin lactose broth, or (3) formate ricinoleate broth are used; providing the worker demonstrates the conformance of results obtained with these three media, to the required conditions.

Moreover, it is recommended that this reference to Standard Methods shall be considered as applicable to all details of technique, including the selection and preparation of apparatus and culture media, the collection and handling of samples, and allowable intervals between collection and examination. As the standard procedure cited in this reference does not require differentiation between the various forms or types which are included under the general definition of the coliform group as given above, it has not seemed advisable, in the present state of knowledge, to require such differentiation in the application of the Standards. Two considerations tend to militate against the necessity or propriety of complicating the Standards by the incorporation of such differentiation. First, an analysis of the records of a considerable number of municipal water supplies during the past 20 years suggests that the coliform group has served effectively as an indicator of fecal pollution when the procedure for the determination of the coliform group was carried out in exact accordance with the methods specified. Second, competent research findings indicate that all constituent members of the coliform group are usually found in human fecal material. Consequently, it seems advisable to emphasize here a strict observance of the methods referred to, rather than to introduce any unnecessary procedures for the differentiation of the coliform group.

The principles involved in the quantitative interpretation of fermentation tests according to the "most probable number" concept,

in multiple portions of equal volume and in portions constituting a geometric series, were discussed fully in appendix III of the Standards promulgated in 1925 and since then this discussion has been amplified by various authors. As these principles now are understood universally and enumeration procedures concerned are used quite widely, it has not appeared necessary to repeat this discussion in the current revision. The testing of multiple portions of equal volume affords a more precise measure of the density of the coliform group within a relatively narrow range of variation than does the testing of portions in geometric series. Therefore, as the waters which will be offered for certification should represent only a narrow range of very moderate pollution, the Standards require that the examination of each sample shall consist of the separate testing of five equal portions either of 10 ml. or of 100 ml. each.[2] For laboratories which are equipped to make such tests, the examination of the larger, 100 ml., portions provides for: (1) a more definitive measure of the density of coliforms in the range of about 1 per 100 ml., as established by the Standards, and (2) information as to the approach of unfavorable conditions in the water.

The procedure for the examination of 100 ml. portions offers no difficulty in laboratory technique, the only additional requirements being larger containers, larger quantities of media, slightly greater incubator space, and the collection of a larger sample. If economy of incubator space is desirable, multiple-strength lactose broth may be used in conformity with the provisions in Standard Methods of Water Analysis. In practice it has been found satisfactory to use standard dilution water bottles of 160–180 ml. capacity as tubes or containers for the 100 ml. portions. These bottles, containing 30–35 ml. of quadruple-strength lactose broth and equipped with the ordinary inverted vial or with a Cowles (*6*) tube, are sterilized in the usual manner. For convenience in checking volumes, or to eliminate the necessity for the use of volumetric pipettes, the bottles may be graduated at the 35 ml. and at the 135 ml. points. This procedure lends itself readily to the planting of samples directly into lactose broth at the site of collection of the sample.

There is, of course, no essential reason why the number of portions tested should be five rather than some larger number, except that labor and materials are limited, and five portions are considered sufficient for such precision as is ordinarily necessary.

With reference to the total number of samples which should be examined, the intervals at which they should be collected, and the location of the sampling points on the distribution system, it is recog-

---

[2] It is advisable, however, especially in the examination of waters of unknown quality or which may be suspected to be highly polluted, to make simultaneous tests in portions of a geometric series, ranging from 100 ml to 1.0 ml. or less.

nized that such requirements are affected by (1) the nature of the source of the water, (2) the character and the consistency of the treatment provided, (3) the sanitary conditions of the distribution system, (4) the average daily volume of water delivered to the distribution system, and (5) the total population served. It is obviously desirable, from the standpoint of precision and significance of results, to examine a large number of samples collected at frequent and regular intervals, and, when normal conditions obtain, preferably at uniformly spaced points on the distribution system, but when abnormal conditions exist, at such points as will produce the maximum information concerning the cause of any abnormalities in water quality. It is obvious also that it is not practicable to lay down hard and fast requirements adapted to the qualities of each supply in question. It has appeared desirable, however, to establish for the ideal supply a requirement for the minimum number of samples to be collected and examined during specified intervals, based on the population served, and to delegate to the inspecting officer, who should have knowledge of the conditions affecting the supply in question, the authority to increase the number of samples required and to fix the times and the sites for collection of samples on the distribution system.

In accordance with these principles, the first requirement stated in the Standards, namely, that "of all the standard 100 ml: or 10 ml. portions examined per month in accordance with the specified procedure, not more than 60 percent or 10 percent, respectively, shall show the presence of organisms of the coliform group," may be interpreted as implying that the mean density of organisms of the coliform group shall not exceed about 1 per 100 ml. The second clause of the Standards, which specifies that not more than 20 percent (or 5 percent when 10 ml. portions are examined) of samples tested (or not more than one sample if the whole number tested be less than 20 for 10 ml. portions or less than 5 for 100 ml. portions) shall show the presence of organisms of the coliform group in all five 100 ml. portions, or in three or more of the five 10 ml. portions, is more complex in its implications [3] and more difficult to explain. It recognizes that, according to the laws of chance, this result would occur in a certain small proportion of the samples tested, even though the mean density of organisms of the coliform group in the whole body of water tested actually remained constant at about 1 per 100 ml. or less and, consequently, that it warrants no inference of actual fluctuations in density unless it occurs with greater frequency than would be expected according to the theory of chance occurrences. A more frequent occurrence, sufficient to indicate occasional higher pollution, is believed, however, to be an indication of potential danger, even though

[3] This was ably discussed in appendix III of the 1925 Standards and this discussion has been amplified by various authors since that time.

the average quality of the water should be satisfactory (that is, in conformity to the first provision of the Standards). This clause of the Standards undertakes, therefore, to set a limit to the allowable frequency of positive results in an increased number of portions of any sample. It is necessary in so doing to recognize that water supplies actually do vary in their degree of pollution from day to day, and that in many instances the series of tests which will be considered may be small; hence, the limit (20 and 5 percent) is set at a frequency which is higher than reasonably might be expected in a large series of samples from a water in which the actual density of organisms of the coliform group never greatly exceeded 1 per 100 ml. In the case of 10 ml. portions the limit for this frequency is set at 5 percent, which is approximately five times higher than the normal expectancy. With 100 ml. portions the requirement is somewhat more stringent as the 20 percent frequency allowed is only about 2.5 times higher than reasonably might be expected. As the possibility of an increase in pollution is ever present, the Standards provide further that when positive results are obtained in increased numbers of portions of any sample, additional and more frequent samples shall be collected and examined. The results from such additional samples will demonstrate whether the increase in positive results are due to the probabilities of chance, or to an actual increase in density of pollution.

In the bacteriological standard which has been promulgated, the committee has undertaken to set up two controlling factors: (1) two limiting values to the density of organisms of the coliform group, one limit applying to the mean density as calculated from the entire series of tests made during any one month and one to the range and frequency of occasional deviations from this mean, and (2) failure to conform with the specified procedures for making the bacteriological examinations may be used as the basis for a refusal of certification of a supply. That is, a failure to follow the specified procedures might produce results which would not provide for a satisfactory opinion of the quality of the water supply concerned.

REFERENCES

(1) Manual of Water Quality and Treatment. American Water Works Association, 1940. Reprinted 1941.
(2) Public Health Bulletins 172 and 193; also Reprints 1114, 1170, 1292, 1434, and 1565 from the Public Health Reports, U. S. Public Health Service.
(3) Standard Methods for the Examination of Water and Sewage. American Public Health Association, 1936.
(4) DeMartini, F. E.: Corrosion and the Langelier calcium carbonate saturation index. J. Am. Water Works Assoc., 30:85 (1938).
(5) Moore, Edward W.: Graphic determination of carbon dioxide and the three forms of alkalinity. J. Am. Water Works Assoc., 31:51 (1939).
(6) Cowles, P. B.: A modified fermentation tube. J. Bact., 38:677 (1939).

DEATHS DURING WEEK ENDED JANUARY 2, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Jan. 2, 1943	Corresponding week 1942
Data from 86 large cities of the United States:		
Total deaths	9,996	9,035
Average for 3 prior years	9,081	
Total deaths, first 52 weeks of year	435,592	429,433
Deaths per 1,000 population, first 52 weeks of year, annual rate	11.8	11.6
Deaths under 1 year of age	672	555
Average for 3 prior years	567	
Deaths under 1 year of age, first 52 weeks of year	30,147	27,241
Data from industrial insurance companies.		
Policies in force	65,275,760	64,826,273
Number of death claims	11,201	10,639
Death claims per 1,000 policies in force, annual rate	8.9	8.6
Death claims per 1,000 policies, first 52 weeks of year, annual rate	9.1	9.3

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 9, 1943

Summary

While reports for the current week show increases over the preceding week's totals for seven of the nine common communicable diseases included in the following tables, all except those of meningococcus meningitis were near or below the median numbers reported in the corresponding weeks of the 5-year period 1938–42.

A total of 278 cases of meningococcus meningitis was reported for the week, as compared with 187 for the preceding week, and 92 for the next earlier week. The current figure is higher than that for the corresponding week of any other year since 1928, the earliest year for which comparable figures became available. The corresponding 5-year (1938–42) weekly median is 45. The largest numbers were reported in Virginia (30 cases), New York (23; 16 in New York City), Pennsylvania (20; 8 in Philadelphia), Oregon (19), Maine and Maryland (16 each; 12 in Baltimore), Massachusetts (15), and California (13).

There were 34 cases of poliomyelitis reported, 10 of which were in California, 4 in Texas, and 2 in Arkansas. The corresponding median is 28.

The number of reported cases of measles increased from 5,786 to 8,182 for the current week as compared with 7,892 for the corresponding week last year and 7,816 for the same week in 1941, which is also the 5-year median. Of the current week's total, 2,238 cases were reported in Pennsylvania, 695 in Washington, and 670 in New York.

A total of 3,457 cases of scarlet fever was reported, as compared with 2,858 for the preceding week and a median of 3,597. About 62 percent of the current total number was reported in the East North Central, Middle Atlantic, and New England States.

Although below the 5-year median, the number of smallpox cases reported was 42, of which 15 were in Indiana, 8 in Texas, and 6 in Pennsylvania.

The number of reported cases of whooping cough increased from 2,632 to 3,648. The current incidence is slightly above the 5-year median.

Other reports for the week include 1 case of anthrax (in Pennsylvania), 188 cases of dysentery (22 amebic, 134 bacillary, and 32 unspecified), 6 cases of infectious encephalitis, 1 case of Rocky Mountain spotted fever (in Indiana), 40 cases of tularemia, 88 cases of endemic typhus fever, 34 of which were in Texas and 14 each in North Carolina and Georgia.

There were 10,709 deaths recorded in 90 large cities of the United States for the week ended January 9, 1943, as compared with 10,222 for the preceding week, and a 3-year average (1940–42) of 9,838.

Below are given the cumulative numbers of cases of certain diseases reported for 52-week periods of 1942 and 1941, and median numbers for comparable periods of the years 1937-41. In some instances the figures used were for the calendar year instead of the 52-week period.

52 weeks	Anthrax	Diphtheria	Dysentery			Encephalitis, infectious	Influenza	Leprosy	Measles
			Amebic	Bacillary	Unspecified				
1942	78	15,559	1,179	12,127	6,405	568	109,167	45	505,861
1941	96	17,007	3,175	24,281	1,461	3,045	423,246	49	866,608
Median, 1937–41	65	24,086	3,039	[1] [illegible] 531	[1] 1,135	1,267	292,271	49	374,854

52 weeks	Meningitis, meningococcus	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever	Typhus fever	Whooping cough
1942	3,774	4,193	456	126,853	863	915	6,703	3,729	177,916
1941	2,039	9,089	505	127,735	1,356	1,482	8,513	2,780	207,843
Median, 1937-41	2,039	9,089	457	162,052	9,574	1,620	12,736	2,393	207,843

[1] 4-year average

Telegraphic morbidity reports from State health officers for the week ended January 9, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	Jan. 9, 1943	Jan. 10, 1942		Jan. 9, 1943	Jan. 10, 1942		Jan. 9, 1943	Jan. 10, 1942		Jan. 9, 1943	Jan. 10, 1942	
NEW ENG.												
Maine	0	1	2	------	1	10	25	174	74	16	1	0
New Hampshire	0	0	0	3	------	----	44	11	11	0	0	0
Vermont	0	1	0	24	------	------	328	7	24	0	1	0
Massachusetts	2	5	5	----	------	------	515	213	213	15	4	2
Rhode Island	2	0	0	25	1	-----	7	38	1	4	0	0
Connecticut	1	0	0	11	7	10	376	110	110	0	2	1
MID. ATL.												
New York	24	16	16	[1] 17	[1] 8	[1] 23	670	493	493	23	7	5
New Jersey	3	7	12	27	18	98	346	134	134	11	3	1
Pennsylvania	16	23	24	7	------	------	2,238	1,121	1,121	20	2	2
E. NO. CEN.												
Ohio	18	12	23	16	26	7	40	95	95	8	1	4
Indiana	5	13	17	31	49	46	149	42	33	1	2	1
Illinois	16	41	41	13	18	18	169	89	89	6	0	2
Michigan [2]	4	3	5	1	24	------	45	83	189	5	0	0
Wisconsin	4	1	1	62	31	49	303	273	359	1	2	0
W. NO. CEN.												
Minnesota	2	2	3	2	1	1	6	208	109	0	0	0
Iowa	5	11	9	2	------	2	50	90	90	2	1	1
Missouri	3	2	11	6	10	70	24	27	27	7	0	0
North Dakota	0	2	2	49	36	36	1	71	31	0	1	0
South Dakota	21	2	3	------	------	1	103	2	2	2	0	0
Nebraska	4	2	2	60	9	9	130	4	8	6	0	0
Kansas	4	6	6	6	9	16	64	186	112	2	2	2
SO. ATL.												
Delaware	1	1	1	------	------	------	6	1	3	0	0	0
Maryland [2]	10	15	4	9	11	15	13	260	11	16	2	1
Dist. of Col	0	0	3	5	6	2	9	5	3	2	0	0
Virginia	15	29	22	659	346	454	53	155	146	30	1	1
West Virginia	8	7	9	38	16	16	15	232	61	2	0	0
North Carolina	24	27	33	12	6	17	9	639	317	3	1	1
South Carolina	4	7	11	651	474	909	5	82	33	11	0	1
Georgia	18	13	16	181	105	133	4	225	61	1	2	0
Florida	13	7	7	6	15	15	8	21	23	0	1	1
E. SO. CEN.												
Kentucky	5	6	10	2	2	56	93	26	60	2	0	1
Tennessee	4	11	11	89	72	143	39	40	39	9	0	2
Alabama	1	7	12	106	177	377	7	23	46	4	1	1
Mississippi [1]	3	16	11	------	------	------	------	------	------	0	1	1
W. SO. CEN.												
Arkansas	15	4	12	179	192	192	39	73	44	3	0	0
Louisiana	7	13	13	9	7	15	11	13	3	4	0	1
Oklahoma	5	13	14	74	187	222	6	157	7	4	1	1
Texas	48	46	34	1,157	1,520	492	22	499	51	3	1	2
MOUNTAIN												
Montana	0	0	2	14	9	9	38	52	15	0	0	0
Idaho	1	0	0	2	------	3	220	1	9	2	0	0
Wyoming	3	0	0	54	4	4	10	14	6	2	0	0
Colorado	13	12	12	45	62	62	87	124	92	5	0	0
New Mexico	1	1	2	--	6	6	10	29	29	1	0	1
Arizona	0	1	8	115	195	178	7	87	6	3	0	1
Utah [2]	1	0	0	32	9	9	551	48	48	3	1	0
Nevada	0	0	------	------	------	------	33	4	-----	2	0	------
PACIFIC												
Washington	7	0	0	------	2	-----	695	31	31	5	2	0
Oregon	1	2	2	16	21	71	412	83	29	19	0	0
California	30	17	21	35	108	108	147	1,495	90	13	2	2
Total	372	405	488	3,852	3,800	3,800	8,182	7,892	7,816	278	45	45

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended January 9, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis, Week ended—Jan. 9, 1943	Poliomyelitis, Week ended—Jan. 10, 1942	Poliomyelitis, Median 1938–42	Scarlet fever, Week ended—Jan. 9, 1943	Scarlet fever, Week ended—Jan. 10, 1942	Scarlet fever, Median 1938–42	Smallpox, Week ended—Jan. 9, 1943	Smallpox, Week ended—Jan. 10, 1942	Smallpox, Median 1938–42	Typhoid and paratyphoid fever, Week ended—Jan. 9, 1943	Typhoid and paratyphoid fever, Week ended—Jan. 10, 1942	Typhoid and paratyphoid fever, Median 1938–42
NEW ENG.												
Maine	0	2	0	16	11	11	0	0	0	0	0	0
New Hampshire	0	1	0	6	11	11	0	0	0	0	0	0
Vermont	0	1	0	5	8	8	0	0	0	0	0	0
Massachusetts	1	1	1	331	303	142	0	0	0	2	2	1
Rhode Island	1	0	0	21	13	6	0	0	0	0	0	0
Connecticut	0	0	0	75	24	39	0	0	0	1	1	0
MID. ATL.												
New York	1	0	1	373	367	361	0	0	0	2	4	4
New Jersey	0	1	0	76	120	130	1	0	0	0	0	0
Pennsylvania	0	1	0	226	292	281	6	0	0	5	9	9
E. NO. CEN.												
Ohio	1	1	1	327	290	318	3	0	3	3	3	3
Indiana	1	1	1	92	70	187	15	2	11	1	2	1
Illinois	0	0	1	219	199	383	0	0	3	2	3	3
Michigan [2]	1	0	0	72	100	156	0	0	0	0	0	0
Wisconsin	1	0	0	273	145	145	0	0	4	0	0	1
W. NO. CEN.												
Minnesota	0	0	1	66	69	89	0	1	5	2	0	0
Iowa	1	1	1	53	24	69	0	0	16	1	0	0
Missouri	1	0	0	71	33	57	0	1	1	0	1	2
North Dakota	0	0	0	21	16	26	0	0	1	0	0	0
South Dakota	1	2	0	38	54	29	1	0	5	0	0	0
Nebraska	0	0	0	40	22	35	0	0	1	0	1	0
Kansas	1	0	0	80	84	142	0	0	0	0	0	1
SO. ATL.												
Delaware	0	0	0	12	40	14	0	0	0	0	1	0
Maryland [2]	0	1	0	43	55	54	0	0	0	2	4	2
Dist. of Col.	1	0	0	15	10	11	0	0	0	0	0	0
Virginia	1	0	0	71	32	46	0	0	0	1	8	3
West Virginia	0	1	0	49	62	62	0	0	0	4	0	2
North Carolina	0	0	0	78	102	58	0	0	0	0	2	1
South Carolina	1	1	0	12	13	13	0	0	0	1	8	4
Georgia	0	0	1	23	27	18	0	0	0	4	6	3
Florida	0	1	0	13	7	7	0	1	0	0	3	2
E. SO. CEN.												
Kentucky	1	0	1	58	60	60	0	0	0	1	2	1
Tennessee	1	1	0	49	48	38	0	1	1	0	0	1
Alabama	0	1	0	22	36	27	2	0	0	0	3	2
Mississippi [2]	0	1	0	13	20	13	0	0	0	0	0	0
W. SO. CEN.												
Arkansas	2	1	0	6	7	13	1	0	2	6	1	1
Louisiana	0	0	0	10	9	10	0	0	0	2	3	4
Oklahoma	0	1	0	18	16	28	0	1	8	3	1	1
Texas	4	2	1	52	54	54	8	1	0	5	5	9
MOUNTAIN												
Montana	0	1	0	17	26	26	1	0	1	0	0	0
Idaho	0	0	0	8	5	10	3	0	0	0	1	1
Wyoming	1	0	0	59	5	7	0	0	0	0	0	0
Colorado	0	0	0	60	24	33	0	1	6	1	0	1
New Mexico	0	0	0	6	10	10	0	0	0	1	3	3
Arizona	1	0	0	5	7	5	0	0	0	0	0	2
Utah [2]	0	0	0	76	21	21	0	0	0	1	0	0
Nevada	0	0	------	7	0	------	0	0	------	0	0	------
PACIFIC												
Washington	0	0	0	30	52	48	0	0	1	0	1	1
Oregon	0	2	1	14	12	32	1	0	0	0	0	1
California	10	2	2	150	86	111	0	1	1	2	6	4
Total	34	28	28	3,457	3,101	3,454	42	10	74	53	84	84

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended January 9 1943—Continued

Division and State	Whooping cough: Week ended Jan. 9, 1943	Whooping cough: Week ended Jan. 10, 1942	Whooping cough: Median 1938–42	Week ended Jan. 9, 1943: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt spotted fever	Tularemia	Typhus fever
NEW ENG.												
Maine	131	29	41	0	0	0	0	0	0	0	0	0
New Hampshire	0	30	5	0	0	0	0	0	0	0	0	0
Vermont	64	33	50	0	0	0	0	0	0	0	0	0
Massachusetts	247	265	248	0	0	2	0	0	0	0	0	0
Rhode Island	30	61	36	0	0	0	0	0	0	0	0	0
Connecticut	85	78	71	0	0	7	0	0	0	0	0	0
MID. ATL.												
New York	416	665	389	0	2	27	0	1	0	0	0	0
New Jersey	204	234	215	0	1	0	0	0	0	0	1	0
Pennsylvania	410	283	216	1	0	0	0	0	0	0	0	0
E. NO. CEN.												
Ohio	144	227	227	0	0	2	0	0	0	0	6	0
Indiana	26	29	29	0	0	0	0	0	0	[3] 1	4	0
Illinois	199	174	145	0	2	1	0	0	0	0	5	0
Michigan [2]	97	166	100	0	0	1	0	0	0	0	0	0
Wisconsin	192	207	121	0	0	0	0	0	0	0	0	0
W. NO. CEN.												
Minnesota	84	34	35	0	0	0	0	0	0	0	1	0
Iowa	14	11	9	0	0	0	0	0	0	0	1	0
Missouri	29	17	17	0	0	0	0	1	0	0	1	0
North Dakota	21	6	16	0	0	0	0	0	0	0	0	0
South Dakota	8	12	3	0	0	0	0	0	0	0	0	0
Nebraska	2	10	12	0	0	0	0	0	0	0	0	0
Kansas	46	59	59	0	0	0	0	2	0	0	3	0
SO. ATL.												
Delaware	8	0	8	0	0	0	0	0	0	0	0	0
Maryland [2]	77	21	46	0	0	0	0	0	0	0	1	0
Dist. of Col.	20	38	17	0	0	0	0	0	0	0	0	0
Virginia	61	46	81	0	0	0	24	0	0	0	7	1
West Virginia	22	40	40	0	0	0	0	0	0	0	0	1
North Carolina	115	295	192	0	0	0	0	0	0	0	1	14
South Carolina	36	30	55	0	0	9	0	0	0	0	1	4
Georgia	30	18	18	0	1	1	0	0	0	0	1	14
Florida	15	24	6	0	1	0	0	0	0	0	0	5
E. SO. CEN.												
Kentucky	23	75	22	0	0	0	0	0	0	0	2	0
Tennessee	25	20	19	0	0	0	1	0	0	0	3	0
Alabama	31	13	14	0	0	0	0	0	0	0	0	12
Mississippi [3]	----	----	----	0	0	0	0	0	0	0	0	0
W. SO. CEN.												
Arkansas	33	3	10	0	6	0	0	0	0	0	0	0
Louisiana	12	1	2	0	0	0	0	0	0	0	0	2
Oklahoma	13	1	13	0	0	0	0	0	0	0	0	0
Texas	230	81	81	0	7	81	0	0	0	0	0	34
MOUNTAIN												
Montana	34	25	13	0	0	0	0	0	0	0	0	0
Idaho	3	1	4	0	0	0	0	0	0	0	0	0
Wyoming	5	16	8	0	0	0	0	2	0	0	0	0
Colorado	12	27	27	0	0	0	0	0	0	0	0	0
New Mexico	9	53	15	0	0	0	0	0	0	0	0	0
Arizona	37	21	19	0	0	0	7	0	0	0	0	0
Utah [2]	20	44	32	0	0	0	0	0	0	0	0	0
Nevada	10	4	----	0	0	0	0	0	0	0	2	0
PACIFIC												
Washington	16	137	43	0	0	0	0	0	0	0	0	0
Oregon	5	35	10	0	2	3	0	0	0	0	0	0
California	297	165	154	0	0	0	0	0	0	0	0	0
Total	3,648	3,864	3,627	1	22	134	32	6	0	1	40	87

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Delayed report.

WEEKLY REPORTS FROM CITIES

City reports for week ended December 26, 1942

This table lists the reports from 85 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga	0	0	11	2	3	0	4	0	4	0	0	2
Baltimore, Md	0	0	4	1	1	7	28	0	15	0	0	45
Barre, Vt	0	0	----	0	2	0	0	0	0	0	0	0
Billings, Mont	0	0	----	0	0	0	1	0	0	0	0	2
Birmingham, Ala	0	0	2	1	0	0	4	0	5	0	0	0
Boise, Idaho	0	0	----	0	0	0	0	0	0	0	0	0
Boston, Mass	1	0	----	0	38	0	16	0	73	0	0	24
Bridgeport, Conn	0	0	1	0	0	1	4	0	4	0	0	2
Brunswick, Ga	0	0	----	0	0	0	0	0	0	0	0	0
Buffalo, N. Y	1	0	----	1	93	1	11	0	6	0	0	25
Camden, N J	0	0	----	0	3	0	1	0	3	0	0	6
Charleston, S. C	0	0	35	0	0	0	3	0	0	0	0	0
Charleston, W. Va	0	0	----	0	0	0	0	0	1	0	0	0
Chicago, Ill	9	0	3	1	42	2	37	0	52	0	0	49
Cincinnati, Ohio	0	0	----	1	11	0	6	0	12	0	0	5
Cleveland, Ohio	4	0	4	3	2	2	13	0	38	0	0	51
Columbus, Ohio	0	0	----	0	1	0	2	0	13	0	0	1
Concord, N. H	0	0	----	0	1	0	1	0	0	0	0	0
Cumberland, Md	0	0	----	0	0	0	1	0	1	0	0	0
Dallas, Tex	2	0	----	0	1	0	3	0	1	0	0	1
Denver, Colo	5	0	9	0	19	1	5	0	8	0	0	1
Detroit, Mich	1	0	----	1	9	0	10	0	32	0	0	59
Duluth, Minn	0	0	----	0	0	0	2	0	0	0	0	0
Fall River, Mass	0	0	----	0	0	0	0	0	0	0	0	4
Flint, Mich	0	0	----	0	2	0	4	0	3	0	0	3
Fort Wayne, Ind	0	0	----	0	0	0	1	0	0	0	0	0
Frederick, Md	0	0	----	0	0	0	0	0	0	0	0	0
Galveston, Tex	1	0	----	1	0	0	1	0	1	0	0	0
Grand Rapids, Mich	0	0	----	0	0	0	2	0	1	0	0	7
Great Falls, Mont	0	0	----	0	1	0	0	0	2	0	0	6
Hartford, Conn	1	0	----	0	4	1	5	0	0	0	0	0
Helena, Mont	0	0	----	0	0	0	0	0	0	0	0	0
Houston, Tex	0	0	----	0	0	0	5	0	1	0	2	8
Indianapolis, Ind	2	0	----	0	10	0	2	0	4	0	0	2
Kansas City, Mo	0	1	----	0	2	0	3	0	21	0	0	0
Kenosha, Wis	0	0	----	0	1	0	0	0	3	0	0	1
Little Rock, Ark	0	0	----	0	0	0	1	0	0	0	0	0
Los Angeles, Calif	4	0	11	4	11	0	14	4	19	0	0	16
Lynchburg, Va	0	0	----	0	0	0	4	0	1	0	0	0
Memphis, Tenn	0	0	----	0	0	0	6	0	1	0	0	0
Milwaukee, Wis	0	0	----	0	39	0	4	0	65	0	0	11
Minneapolis, Minn	0	0	----	0	1	0	6	1	11	0	0	5
Missoula, Mont	0	0	----	0	0	0	0	0	0	0	0	0
Mobile, Ala	0	0	2	2	0	0	3	0	2	0	0	0
Nashville, Tenn	1	0	----	0	4	0	2	1	2	0	0	1
Newark, N. J	0	0	3	0	11	0	6	0	5	0	0	7
New Haven, Conn	0	0	----	0	0	0	1	0	1	0	0	0
New Orleans, La	1	0	2	3	3	0	9	0	1	0	2	0
New York, N Y	19	1	10	3	13	5	89	2	146	0	2	56
Omaha, Nebr	1	0	----	0	1	0	4	0	5	0	0	1
Philadelphia, Pa	0	0	3	1	520	3	38	0	46	0	0	68
Pittsburgh, Pa	0	0	1	3	1	1	8	0	8	0	0	5
Portland, Maine	1	0	----	0	0	4	2	0	3	0	0	10
Providence, R I	0	0	----	0	0	1	3	0	2	0	0	26
Pueblo, Colo	0	0	----	0	0	0	0	0	1	0	0	1
Racine, Wis	0	0	----	0	23	0	0	0	21	0	0	0
Raleigh, N. C	0	0	----	0	0	0	2	0	1	0	0	0
Reading, Pa	0	0	----	0	22	0	0	0	0	0	0	4
Richmond, Va	0	0	2	1	0	1	6	0	2	0	0	1

City reports for week ended December 26, 1942—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
Roanoke, Va	0	0		0	0	0	0	0	0	0	0	0
Rochester, N. Y	0	0		0	6	0	2	0	4	0	0	27
Sacramento, Calif	5	0		0	1	1	2	0	1	0	0	1
Saint Louis, Mo	0	0		0	0	0	11	0	5	0	4	9
Saint Paul, Minn	0	0		1	1	0	6	0	6	0	0	8
Salt Lake City, Utah	0	0		0	138	0	1	0	20	0	0	6
San Antonio, Tex	0	0		1	0	0	4	4	0	0	0	3
San Francisco, Calif	0	0		0	5	0	5	1	9	0	0	9
Savannah, Ga	0	0		0	1	0	2	0	1	0	0	0
Seattle, Wash	0	0		1	23	0	3	0	0	0	0	7
South Bend, Ind	0	0		0	0	0	0	0	0	0	0	3
Spokane, Wash	0	0	1	1	32	0	1	0	5	0	0	2
Springfield, Ill	0	0		0	0	0	1	0	1	0	0	2
Springfield, Mass	0	0		0	23	0	8	0	65	0	0	2
Syracuse, N Y	0	0		0	2	0	4	0	1	0	0	17
Tacoma, Wash	0	0		0	36	0	3	0	0	0	0	0
Tampa, Fla	0	0		1	1	0	3	0	1	0	0	0
Topeka, Kans	0	0		0	7	1	1	0	1	0	0	1
Trenton, N J	0	0	1	0	0	0	2	0	5	0	0	0
Washington, D. C	1	0	3	2	0	1	12	0	12	0	0	9
Wheeling, W. Va	0	0		0	0	0	1	0	2	0	0	2
Wichita, Kans	2	0		0	2	0	8	0	5	0	1	1
Wilmington, Del	0	0		0	0	0	4	0	0	0	0	5
Wilmington, N C	1	0		0	0	0	1	0	2	0	0	8
Winston-Salem, N C	0	0		0	2	0	4	0	0	0	0	3
Worcester, Mass	0	0		0	8	0	12	0	7	0	0	0

Dysentery, amebic.—Cases Atlanta, 1; New York, 1.
Dysentery, bacillary.—Cases Baltimore, 1, Buffalo, 1, Chicago, 1, Detroit, 1, Little Rock, 1, Los Angeles, 2; New York, 9; Rochester, 1, San Francisco, 1.
Tularemia.—Cases: Chicago, 1; New Orleans, 1; Nashville, 1
Typhus fever—Cases Atlanta, 1, Dallas, 1; Houston, 1; New York, 1, Savannah, 3

Rates (annual basis) per 100,000 population, for the group of 85 cities in the preceding table (estimated population, 1942, 33,824,180)

Period	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
Week ended Dec 26, 1942	9 71	16 65	5 55	182.37	73 84	123 33	0 00	1.70	96.97
Average for week 1937–41	18 54	122 91	[1] 8 68	[2] 169 02	[1] 65 91	156 40	2 49	2 96	161.86

[1] 3-year average, 1939–41.
[2] 5-year median.

PLAGUE INFECTION IN TACOMA, WASHINGTON

Plague infection has been reported proved in pools of fleas and in tissue from rats, *R. norvegicus* and (one specimen) *R. rattus*, taken in Tacoma, Wash., as follows: Collected on December 7, 1942, in pools of 40 fleas from 116 rats and 13 fleas from 8 rats; December 14, 42 fleas from 66 rats and 7 fleas from 7 rats; December 15, tissue from 2 rats, proved separately; December 16, 28 fleas from 66 rats and 17 fleas from 6 rats, *R. rattus*.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended December 12, 1942.—During the week ended December 12, 1942, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		2		7	4		1			14
Chickenpox		11		452	394	114	101	23	53	1,148
Diphtheria		20	5	71	2	6	4	5		113
Dysentery				13						13
Encephalomyelitis							3			3
German measles				2	6	2	4	1	5	20
Influenza		12	2		18	4			9	45
Lethargic encephalitis							1			1
Measles		2		144	199	5	44		10	404
Mumps		54	1	170	820	86	103	38	258	1,530
Pneumonia		6			15	1		1	17	40
Poliomyelitis				1				1		2
Scarlet fever		4	13	162	80	11	18	14	55	357
Tuberculosis		10	7	144	64	11	24	13	26	299
Typhoid and paratyphoid fever		1		10	2					13
Undulant fever								1		1
Whooping cough		3	1	286	96	15	8	10	11	430
Other communicable diseases		7		48	264	34	1	1	7	362

JAMAICA

Notifiable diseases—4 weeks ended December 19, 1942.—During the 4 weeks ended December 19, 1942, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox		6	Scarlet fever		1
Diphtheria		1	Tuberculosis	19	60
Dysentery	3	1	Typhoid fever	4	49
Leprosy		5	Typhus fever	2	1
Puerperal fever		1			

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease, (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements, should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

U S GOVERNMENT PRINTING OFFICE 1943

Public Health Reports

VOLUME 58 JANUARY 22, 1943 NUMBER 4

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol. 58 • JANUARY 22, 1943 • *No. 4*

A NATION-WIDE STUDY OF THE BACTERIAL ETIOLOGY OF THE PNEUMONIAS [1]

By A. S. RUMREICH, *Senior Surgeon, United States Public Health Service;* H. J. SHAUGHNESSY, *Chief, Division of Laboratories, Illinois Department of Public Health;* J. V. MULCAHY, *Chief, Bureau of Bacteriology, New Jersey Department of Health;* J. C. WILLETT, *Chief of Laboratories, St. Louis Department of Public Welfare,* W. H. KELLOGG, *Chief, Division of Laboratories, California Department of Public Health; and* WM. C. MITCHELL, *Director of Laboratories, Colorado State Board of Health*

Acting upon recommendations of the National Advisory Committee on Prevention of Pneumonia Mortality, the United States Public Health Service in 1938 undertook to promote the development of demonstration programs designed to reduce pneumonia mortality, and to assist States, cities, and medical societies with the planning, organization, and conduct of such programs. As an inherent part of these control measures, clinical laboratory facilities were developed to provide for prompt and accurate bacteriologic diagnoses in pneumonia. Special emphasis was placed upon the type determination of pneumococci. Coincidentally, arrangements were made to amass information on the distribution of the various types of pneumococci and other pneumoniogenic organisms in several areas differing widely in pneumonia mortality. For this purpose 6 States were selected; viz, California, Colorado, Illinois, Louisiana, Missouri, and New Jersey. It may be noted from table 1 and the corresponding map (fig. 1) that these States represented both extremes of pneumonia-influenza mortality, 3 being among the highest fifth and 3 among the lowest fifth of the 48 States and the District of Columbia arranged in order of rank as to pneumonia and influenza death rates during the period covered by the study. It may be further noted that representative samples were obtained of all important areas characterized either by high or low pneumonia mortality. Although several practical considerations not related to the aforementioned requirements entered into the negotiations toward establishment of cooperative relationships, and affected the choice of fields of operation, the basic desiderata were achieved.

[1] From the Division of Public Health Methods, National Institute of Health.

TABLE 1.—*Pneumonia and influenza death rates by States. Yearly average 1939–40*

State	Rate per 100,000	State	Rate per 100,000
Connecticut	44.6	North Carolina	77.2
New Jersey [1]	52.2	Delaware	77.8
Oregon	53.8	New Hampshire	79.4
New York	53.9	Maine	80.3
California [1]	56.4		
Wyoming	56.6	West Virginia	81.6
Illinois [1]	58.4	Oklahoma	81.6
Kansas	58.8	Indiana	81.7
Rhode Island	61.0	Texas	83.7
Utah	[2] 61.4	District of Columbia	84.3
		Florida	86.6
Michigan	[2] 61.4	Vermont	90.8
Wisconsin	62.0	Mississippi	91.8
South Dakota	62.1	Arkansas	92.9
Washington	62.6	Virginia	93.0
North Dakota	63.4		
Nebraska	63.6	Missouri [1]	94.8
Massachusetts	67.2	New Mexico	95.8
Montana	67.4	Colorado [1]	96.1
Idaho	67.6	Kentucky	97.0
Minnesota	[2] 68.0	Alabama	97.4
		Georgia	97.6
Pennsylvania	[2] 68.0	South Carolina	99.1
Maryland	73.8	Louisiana [1]	103.8
Iowa	73.9	Tennessee	105.4
Ohio	74.4	Arizona	111.7
Nevada	76.7		

[1] Six States comprising the study area.
[2] The mortality rates for Utah, Michigan, Minnesota, and Pennsylvania were, respectively, 61.37, 61.40, 68.02, and 68.03.

In order to insure the utmost attainable reliability of bacteriologic diagnoses, a technician-training program and a performance-checking system were instituted. To secure uniformity in technical procedures and in interpretation of results, key bacteriologists were assigned to each of the 6 chosen areas, after receiving an intensive course of training of from 4 to 6 weeks in the Pneumonia Control Division of the Bureau of Laboratories of the New York City Department of Health. These bacteriologists then formed a cadre for the intensive training of medical diagnostic laboratory technicians from public and private laboratories in each of the 6 States. Seven hundred and twenty technicians availed themselves of this opportunity to participate in refresher courses, of 2 days' to a week's duration, subsidized by the State departments of health.

As a further safeguard, provision was made in each of the 6 States for control checks on the performance of technicians. In 5 of the States a system was established of reexamining, at intervals, specimens from various laboratories in the State by the Public Health Service bacteriologist. In 4 of these 5 States this plan was followed until well into the second year of the study-demonstration period, and 5,693 specimens from 5,198 cases were thus reexamined and checked. In the sixth State the practice of periodically submitting "unknown" specimens to each laboratory for diagnosis was followed. Under both systems, laboratories whose performance was found to

be imperfect were promptly assisted in overcoming their deficiencies. with gratifying results.

Under the reexamination plan adopted by 5 of the States, after removal of samples for examination by the local diagnostic laboratory, the specimens were promptly refrigerated without addition of

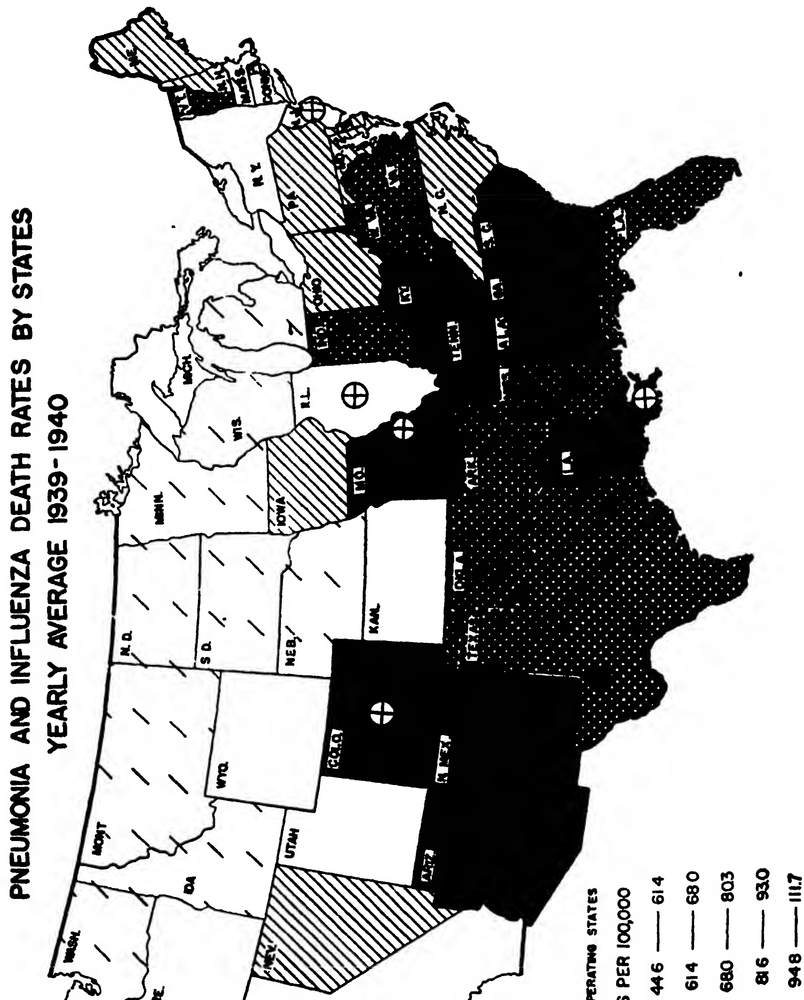


FIGURE 1.—Geographic variation in pneumonia-influenza mortality in the United States, 1939-40

any preservative; they were then collected at intervals not exceeding 48 hours, and transported by messenger to the central control laboratory. As an alternate procedure, utilized in the case of a few outlying laboratories, specimens were shipped in vacuum-insulated jars, after several hours of preliminary refrigeration. No impairment

for purposes of pneumococcus typing was detected in specimens handled by either of the above methods. No difficulty was encountered in typing pneumococci present in specimens obtained after institution of sulfonamide therapy.

A total of 364 laboratories, including private and public hospital, private medical diagnostic, and public health laboratories, participated in the control programs and cooperated in the study. The number of laboratories in each classification is given in table 2.

TABLE 2.—*Classification of cooperating laboratories*

State	Laboratories				
	Private hospital	Public hospital	Medical diagnostic	Public health	Total
California	30	16	16	2	64
Colorado	29	6	14	4	53
Illinois	122	10	20	13	165
Louisiana	5	3	0	2	10
Missouri	20	4	4	1	29
New Jersey	32	3	0	8	43
6 States	238	42	54	30	364

GEOGRAPHIC SOURCES OF MATERIAL

The 3 States representing regions of low pneumonia and influenza mortality, and falling within the topmost one-fifth of the States arranged in the order of increasing death rates, were California, Illinois, and New Jersey; those representing regions of high mortality from the aforementioned causes, and falling within the bottom fifth, were Colorado, Louisiana, and Missouri.

California.—At the suggestion of F. A. Carmelia, the area selected for the study in this State consisted of the following 23 counties: Alameda, Amador, Calaveras, Colusa, Contra Costa, El Dorado, Lake, Marin, Napa, Placer, Sacramento, San Francisco, San Joaquin, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus, Sutter, Tuolumne, Yolo, and Yuba. These counties form a belt extending across the State, from the coast line to the eastern State boundary, and include a diversity of climatic and topographic conditions which may be placed in three broad categories; viz, an evenly cool low-altitude coastal zone, a central valley characterized by wide fluctuations of temperature, and a high-altitude mountainous zone. It was felt that this group of counties might approximate a fair cross-section of most of the State from the standpoint of climate, topography, and racial composition of the population. The number of patients studied was 2,754.

Colorado.—State-supported facilities for pneumonia typing and related bacteriologic examinations were first introduced in counties having organized health services, and were then gradually extended

to provide State-wide coverage. This extension paralleled that of the State pneumonia control program. A total of 1,867 patients was reached.

Illinois.—The comprehensive State public health laboratory system, with branch laboratories serving practically all populous sections, facilitated a rapid extension of diagnostic laboratory services, and stimulated a wider utilization of private hospital and clinical laboratories throughout the State. The study was further promoted by the concurrent development of a successful State pneumonia control program. The number of patients totaled 11,980.

Louisiana.—In the absence of an effective State pneumonia control program, and of coordination between the State public health laboratory and regional public health laboratories, the study area was essentially limited to the city of New Orleans. The number of patients studied was 2,799.

Missouri.—During the two study years, the State-supported program was limited to the city of St. Louis and St. Louis County. It was subsequently extended to all counties having organized health services. The number of patients included in the study was 3,327.

New Jersey.—A State-wide control program with complete laboratory facilities was provided at the outset and maintained throughout the period of the study. A total of 7,728 patients was reached.

CHARACTERISTICS AND COMPOSITION OF CLINICAL MATERIAL

The study covers the 24-month period from October 1, 1938, to September 30, 1940. For purposes of analysis this period has been divided into two 12-month periods; viz, October 1938 to September 1939, inclusive; and October 1939 to September 1940, inclusive. These have been designated as the first and the second years, respectively, of the study.

During the first study year bacteriologic examinations were made of 16,507 specimens from 13,006 patients, and during the second year, of 21,275 specimens from 17,449 patients—a total of 37,782 specimens from 30,455 patients. Both hospitalized and home-treated patients were included.

Of the 30,455 patients, 25,802, or 84.7 percent, had a diagnosis of pneumonia; of these, 15,420 were diagnosed as lobar pneumonia, and 6,092 as bronchopneumonia. Pneumonia diagnoses not anatomically specified, together with lobular and central pneumonias, accounted for the remaining 4,290 pneumonia cases. Other diagnoses totaling 2,290, or 7.5 percent of all cases, included respiratory diseases such as influenza, bronchitis, terminal, hypostatic, and unresolved pneumonias, and diseases complicating pneumonias, including meningitis, otitis media, mastoiditis, and sinusitis. In 2 363 cases, or 7.8 percent, the diagnosis was not recorded.

The final or discharge clinical diagnosis was obtained and recorded in approximately 81 percent of the diagnosed cases; in the remainder only the initial or tentative diagnosis was available.

The seasonal distribution of the pneumonia cases studied is shown diagrammatically in figure 2. The distribution was affected by expansion of several of the pneumonia control programs, especially in two of the low-mortality States.

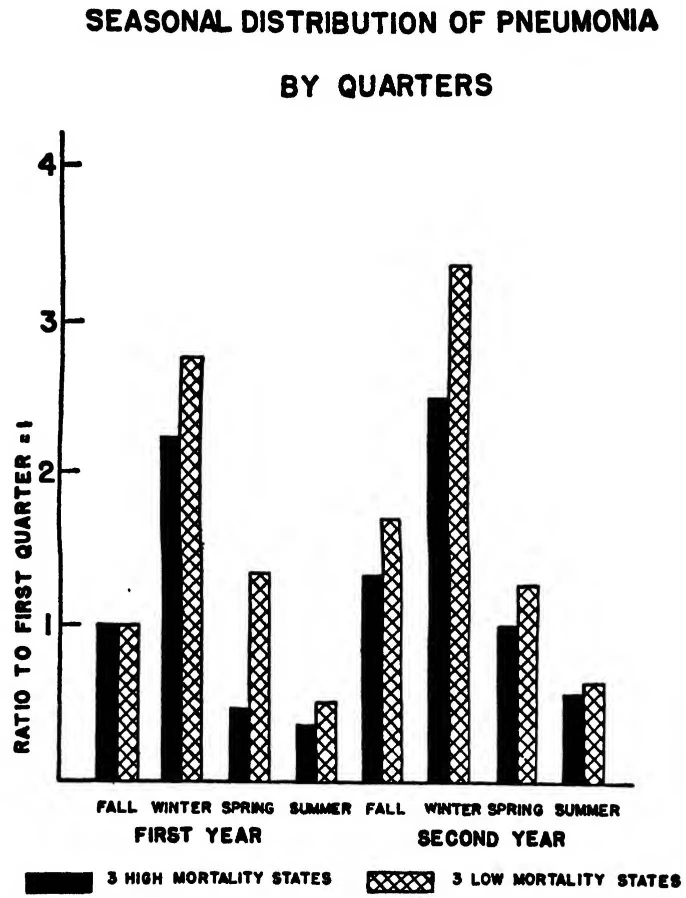


FIGURE 2.—Relative incidence of pneumonia by seasons over the 2-year study period, using number of cases in first fall quarter as a base. Comparative ratios for the three high-mortality and the three low-mortality States.

The distribution of patients according to race and sex is given in table 3. The percentages are based upon 29,621 cases of known race, and 30,383 cases of known sex. In each of the study areas the percentage of Negro patients was somewhat higher than the percentage of Negroes in the general population. The percentage of males among patients of the white race ranged from 56.8 to 68.1,

as compared with a range of 47.8 to 50.6 percent of males in the general white population in the study areas. Among Negro patients the range of percentages of males was 62.4 to 72.0, as against a range of 46.2 to 49.2 in the corresponding general population. For other races, the respective percentage ranges were 65.3 to 85.7 and 56.8 to 78.3. There was a marked excess of male patients in every one of the study areas. This disproportionately high incidence among Negroes and among males of all races is in consonance with previous observations of the pneumonias.

TABLE 3.—*Race and sex of patients*

State	White		Negro		Other races	
	Percent of patients	Percent male	Percent of patients	Percent male	Percent of patients	Percent male
California	94.6	68.1	1.7	71.1	3.7	65.3
Colorado	93.7	63.4	1.3	72.0	5.0	66.7
Illinois	88.7	61.7	11.0	64.9	.3	78.8
Louisiana	52.9	62.4	47.1	62.4	.0	
Missouri	73.6	56.8	26.4	62.5	.0	
New Jersey	86.3	63.7	13.6	66.0	.1	85.7
6 States	83.9	62.5	15.3	64.0	.8	68.1

METHODS AND RESULTS OF PNEUMOCOCCUS TYPING AND OTHER LABORATORY PROCEDURES

The cooperating laboratories examined 37,782 specimens. A somewhat larger number of specimens was submitted to laboratories, but those which were found unsuitable for examination have been excluded from tabulation. In 24,852 cases a single specimen was examined; in 5,603 cases, 2 or more specimens.

Each specimen was examined for pneumococci, type determination of which was based on demonstration of capsular swelling on contact with specific antipneumococcic serum. In order to promote achievement of comparable results, all typing serums were obtained from a single commercial source. As mentioned previously, an effort was also made to minimize variations caused by differences in technique. Uniformity of technique in pneumococcus typing was achieved to a high degree. Examination for other organisms and recording of the findings thereof were not as uniformly carried out, however.

Results of laboratory examinations are given in table 4, those of pneumococcus typing procedures in table 5. Specimens from 22,898 patients were reported to contain pneumococci. In 21,112 cases the pneumococci were identified as one of the then recognized serologic types. In 818 cases two or more types of pneumococci were demonstrated, but with one type clearly predominating. In 318 cases cross-reacting pneumococci were encountered which fell into

6 groups, tentatively designated as A to F, and which seemed to represent distinct types. In 243 cases multiple types were present, with no one type clearly predominating over the others. In 407 cases pneumococci were reported but had not been identified by type either because of the presence of too few organisms in the specimen or because of incomplete examination.

TABLE 4.—*Results of laboratory examinations—all diagnoses*

Specimen	Number of specimens			Percent positive					
				Pneumococci			Other organisms		
	2 years	First year	Second year	2 years	First year	Second year	2 years	First year	Second year
Sputum	27,800	12,019	15,781	76.2	76.6	75 8	5.9	5.2	6 5
Throat culture	3,224	1,305	1,919	67 7	58.7	73.9	14 0	8.6	17 7
Blood culture	5,307	2,506	2,801	72.4	70 7	73.9	5.9	5.3	6.4
Spinal fluid	260	92	168	86 9	79 3	91 1	6.2	6.5	6.0
Pleural fluid	513	262	251	77.2	75.2	79 3	10 9	8.8	13.1
Other	678	323	355	87.3	83.6	90.7	4.7	4 6	4.8
All specimens	37,782	16,507	21,275	75.2	74 4	75.8	6 7	5.5	7.5

TABLE 5.—*Results of pneumococcus typing—all diagnoses*

Typing procedure	2 years			First year			Second year		
	Number of cases	Percent of total	Percent positive	Number of cases	Percent of total	Percent positive	Number of cases	Percent of total	Percent positive
Direct test	19,226	63 1	81 7	7,741	59 5	82.2	11,485	65.8	81 3
Broth culture	2,995	9 9	69 4	1,020	7 8	60 6	1,975	11.3	74.0
Mouse inoculation	2,746	9 0	83.0	1,245	9 6	84 7	1,501	8 6	81 5
Other methods or combinations of methods	5,488	18.0	51 6	3,000	23 1	55 2	2,488	14.3	47 3
All methods	30,455	100 0	75.2	13.006	100 0	74.5	17,449	100.0	75.7

INCIDENCE OF CAUSATIVE ORGANISMS

The absolute incidence of the several categories of bacterial and other agents presumed to have been the infecting organisms is summarized in table 6. It will be noted that the pneumococci were held to be responsible for more than three-fourths of all pneumonias, and that the percentage of cases caused by this group of organisms in each pathologico-anatomic classification of the pneumonias was essentially the same in each of the two study years. The percentage of cases caused by hemolytic streptococci likewise remained fairly constant from one year to the next. The wider variations in the incidence of the other organisms might conceivably have been due in large part to their less frequent occurrence or recognition. The percentage of cases in which no significant organism was recorded was lower in the second year, possibly because of the increased experience of the laboratory technicians.

TABLE 6—*Incidence of etiologic organisms in 6 States, in percentage of organisms to total cases*

Causative organism	2 years					First year					Second year				
	Lobar pneumonia	Bronchopneumonia	Unspecified pneumonias	All pneumonias	All diagnoses	Lobar pneumonia	Bronchopneumonia	Unspecified pneumonias	All pneumonias	All diagnoses	Lobar pneumonia	Bronchopneumonia	Unspecified pneumonias	All pneumonias	All diagnoses
Pneumococcus	82.48	65.79	77.48	77.71	75.18	83.24	62.85	77.63	77.48	74.54	81.95	67.84	77.31	77.87	75.67
Streptococcus hemolyticus	2.00	3.33	3.99	2.65	3.02	1.83	3.04	3.65	2.48	2.69	2.13	3.53	4.39	2.77	3.27
Streptococcus, other	1.30	2.99	1.33	1.70	1.88	.51	1.44	.34	.68	.78	1.84	4.06	2.50	2.47	2.70
Staphylococcus	.82	2.00	1.38	1.19	1.24	1.10	2.52	1.89	1.58	1.52	.62	1.64	.76	.89	1.03
K. pneumoniae	.15	.13	.28	.17	.16	.18	.12	.43	.22	.22	.13	.14	.10	.13	.11
H. influenzae	.06	.25	.09	.11	.15	.06	.32	.13	.14	.19	.07	.20	.05	.10	.11
M. tuberculosis	------	.08	------	.02	.03	------	.04	------	.01	.02	------	.11	------	.03	.04
Fungus	------	.02	------	------	.01	------	.04	------	.01	.01	------	------	------	------	.01
Virus	------	------	.07	.01	.01	------	------	------	------	------	------	------	.15	.02	.02
No significant organism recorded	13.19	25.41	15.38	16.44	18.32	13.08	29.63	15.93	17.40	20.03	13.26	22.48	14.74	15.72	17.04
Number of cases	15,420	6,092	4,290	25,802	30,455	6,290	2,498	2,329	11,117	13,006	9,130	3,954	1,961	14,685	17,449

The relative incidence of the recognized serologic types of pneumococci is given in table 7. The incidence of each pneumococcus type is stated in terms of the percentage of cases caused by the designated type to all cases caused by pneumococci of which the type was determined. The number of type-determined cases in each diagnostic category represents the total of cases caused by single identified types, cases in which multiple types were identified with one type clearly predominating, and cases caused by recognized cross-reacting organisms. Excluded from the totals on which calculations were based were the cases caused by pneumococci the type of which had not been determined by reason of incomplete examination or insufficient number of organisms, and cases in which multiple types were identified with no one type clearly predominant.

The designation >XXXIII was applied to pneumococci which failed to react to any of the available typing serums. This entry is not comparable in the two study years as type XXXIII antipneumococcic serum became available only during the second year. Thus in the first year >XXXIII probably included cases that in the second year are separately classified as type XXXIII.

The pneumococcus type designations A to F were arbitrarily adopted to denote cross-reactors, as follows: A denotes organisms reacting to typing serums XI and XVI; B to combinations of VII, XX, and XXIV; C to various combinations of X, XI, XX, XXIX, and XXXI; D to XIV and XV; E to XXIII and XXVIII, and F to XV and XXIII.

The most prevalent types of pneumococci in each of the six study areas, and in the six States combined, are given in table 8. The types have been arranged in the rank order of their incidence in each study year, and in the entire study period.

The identity of the most prevalent types in each area remained quite constant from one year to the next, although their relative rank sometimes shifted. This shifting was least evident in the three areas which contributed the largest number of cases. Adjustment of type incidence percentages for the first year to the age distribution, by 10-year groups, of the second year in most instances resulted in a convergence of rates but not in an approximation of rank order.

The 10 most prevalent pneumococci in each State area accounted for 67.2 to 78.0 percent of all pneumonias caused by pneumococci of determined type during the 2-year period of the study. In the entire sample area the 10 leading pneumococci, viz, types I, II, III, IV, V, VI, VII, VIII, XIV, and XIX, accounted for 74.6 percent of all type-determined pneumococcic pneumonias.

TABLE 7.—*Pneumococcus type incidence in 6 States, in percentage of type to total type-determined cases*

Pneumococcus type	2 years					First year					Second year				
	Lobar pneumonia	Bronchopneumonia	Unspecified pneumonias	All pneumonias	All diagnoses	Lobar pneumonia	Bronchopneumonia	Unspecified pneumonias	All pneumonias	All diagnoses	Lobar pneumonia	Bronchopneumonia	Unspecified pneumonias	All pneumonias	All diagnoses
I	23.53	8.19	14.07	18.94	17.41	27.79	9.97	14.17	21.76	20.18	20.55	7.07	13.95	16.83	15.38
II	9.34	4.00	3.89	7.39	6.73	9.25	4.45	4.35	7.36	6.86	9.41	3.72	3.33	7.40	6.64
III	13.68	12.11	12.22	13.13	13.33	11.75	12.00	11.12	11.66	12.02	15.04	12.19	13.54	14.24	14.29
IV	4.60	5.07	4.38	4.65	4.58	4.53	5.32	5.03	4.77	4.78	4.64	4.91	3.61	4.56	4.43
V	4.60	2.37	3.05	3.90	3.66	4.84	2.22	2.99	3.99	3.75	4.42	2.45	3.13	3.84	3.60
VI	2.70	7.17	5.28	4.01	4.28	2.38	6.74	5.25	3.76	4.09	2.92	7.45	5.31	4.20	4.43
VII	9.46	5.35	6.48	8.16	7.67	9.48	4.79	6.27	7.97	7.55	9.45	5.71	6.73	8.30	7.76
VIII	7.87	5.59	7.41	7.34	7.14	7.86	6.00	8.08	7.58	7.31	7.87	5.33	6.60	7.16	7.02
IX	1.48	1.95	2.07	1.67	1.72	1.58	2.43	2.26	1.87	1.94	1.41	1.65	1.84	1.51	1.56
X	.95	1.59	1.70	1.20	1.29	.88	1.75	1.92	1.25	1.38	1.00	1.48	1.43	1.16	1.21
XI	.93	1.95	2.13	1.33	1.42	.96	1.75	2.03	1.33	1.40	.91	2.07	2.24	1.34	1.43
XII	1.09	.68	.89	.98	.96	1.09	.81	.90	1.00	.99	1.09	.59	.88	.96	.94
XIII	1.03	1.90	2.01	1.36	1.48	1.13	2.22	2.03	1.52	1.58	.96	1.69	1.97	1.25	1.42
XIV	3.09	4.50	3.30	3.40	3.39	2.91	4.58	3.33	3.30	3.16	3.22	4.44	3.26	3.49	3.55
XV	.86	2.26	1.85	1.30	1.46	.94	2.63	1.86	1.43	1.55	.81	2.03	1.84	1.20	1.38
XVI	.89	2.00	1.94	1.28	1.39	.78	1.75	2.09	1.23	1.36	.97	2.16	1.77	1.33	1.42
XVII	1.09	2.24	2.44	1.54	1.76	1.09	2.49	2.71	1.68	1.99	1.09	2.07	2.11	1.43	1.60
XVIII	1.67	2.96	2.59	2.08	2.25	1.56	2.22	2.71	1.92	2.14	1.75	3.43	2.45	2.20	2.33
XIX	2.34	7.38	4.20	3.64	4.05	1.99	7.08	3.84	3.28	3.49	2.58	7.58	4.63	3.91	4.47
XX	1.16	2.50	2.59	1.66	1.87	.86	1.75	2.77	1.42	1.49	1.37	2.96	2.38	1.84	2.15
XXI	.42	1.30	1.20	.72	.82	.25	1.01	1.13	.57	.67	.53	1.48	1.29	.83	.93
XXII	.79	1.61	2.04	1.16	1.22	.78	1.68	2.20	1.24	1.32	.79	1.57	1.84	1.09	1.14
XXIII	.92	2.62	1.76	1.40	1.60	.66	3.03	1.81	1.33	1.50	1.11	2.37	1.70	1.45	1.67
XXIV	.69	1.43	1.54	[illegible]	1.05	.55	1.28	1.24	.82	.94	.79	1.52	1.90	1.09	1.14
XXV	.54	.57	.62	.56	.57	.59	.74	.62	.62	.59	.50	.47	.61	.51	.56
XXVII	.32	.31	.37	.33	.37	.21	.27	.00	.18	.21	.40	.34	.82	.44	.48
XXVIII	.59	1.33	1.11	.82	.96	.47	.94	1.13	.69	.85	.67	1.57	1.09	.91	1.03
XXIX	.72	2.21	2.13	1.24	1.29	.74	2.56	2.32	1.40	1.43	.70	1.99	1.90	1.13	1.20
XXXI	.43	.86	.65	.55	.63	.43	.88	.73	.57	.67	.44	.85	.54	.54	.60
XXXII	.22	.18	.15	.20	.21	.18	.14	.17	.17	.17	.26	.21	.14	.23	.23
XXXIII	.35	.62	.37	.40	.42	.00	.00	.00	.00	.00	.59	1.02	.82	.71	.72
>XXXIII	.76	2.73	1.88	1.33	1.59	.62	2.22	1.36	1.06	1.24	.86	3.05	2.52	1.54	1.84
A	.22	.68	.59	.37	.42	.23	.67	.51	.37	.44	.20	.68	.68	.37	.41
B	.22	.62	.40	.33	.36	.25	.27	.28	.26	.31	.19	.85	.54	.38	.39
C	.37	.94	.40	.49	.49	.33	1.08	.45	.49	.50	.40	.85	.34	.48	.49
D	.03	.10	.15	.07	.07	.02	.14	.11	.06	.05	.04	.08	.20	.07	.08
E	.02	.08	.15	.06	.05	.02	.14	.23	.08	.08	.03	.04	.07	.04	.03
F	.03	.05	.00	.03	.04	.02	.00	.00	.01	.02	.04	.08	.00	.04	.05
Number of type-determined cases	12,447	3,847	3,241	19,535	22,248	5,125	1,484	1,771	8,380	9,396	7,322	2,363	1,470	11,155	12,852

Table 8.—*Rank of leading types of pneumococci in the pneumonias in 6 representative States*

6 STATES

Rank order	2 years		First year		Second year		First year adjusted	
	Type	Percent	Type	Percent	Type	Percent	Type	Percent
1	I	18.94	I	21.76	I	16.83	I	21.02
2	III	13.13	III	11.66	III	14.24	III	11.93
3	VII	8.16	VII	7.97	VII	8.30	VII	7.90
4	II	7.39	VIII	7.58	II	7.40	VIII	7.47
5	VIII	7.34	II	7.36	VIII	7.16	II	7.18
6	IV	4.65	IV	4.77	IV	4.56	IV	4.75
7	VI	4.01	V	3.99	VI	4.20	VI	4.00
8	V	3.90	VI	3.76	XIX	3.91	V	3.86
9	XIX	3.64	XIV	3.30	V	3.84	XIV	3.56
10	XIV	3.40	XIX	3.28	XIV	3.49	XIX	3.50
Percent of type-determined cases		74.56		75.43		73.93		75.17

CALIFORNIA

Rank order	2 years		First year		Second year		First year adjusted	
	Type	Percent	Type	Percent	Type	Percent	Type	Percent
1	III	13.26	I	15.21	III	14.06	I	14.03
2	I	11.10	III	12.52	VII	10.43	III	13.11
3	VII	9.84	VII	9.29	VIII	7.83	VII	9.01
4	VIII	7.19	II	6.86	I	6.67	IV	6.92
5	IV	5.72	IV	6.86	XIX	4.78	VIII	6.82
6	II	4.82	VIII	6.59	VI	4.64	II	6.09
7	VI	4.61	VI	4.58	IV	4.49	VI	4.72
8	XIX	4.26	XIX	3.77	XIV	3.91	XIX	3.86
9	XIV	3.70	XIV	3.50	XVII	3.19	XIV	3.79
10	XVII	2.65	V	2.96	II	2.61	V	3.06
Percent of type-determined cases		67.15		72.14		62.61		71.41

COLORADO

Rank order	2 years		First year		Second year		First year adjusted	
	Type	Percent	Type	Percent	Type	Percent	Type	Percent
1	I	16.08	I	18.39	I	14.78	I	17.13
2	II	15.25	II	16.55	II	14.52	II	16.87
3	III	12.45	III	8.97	III	14.40	III	10.31
4	VII	8.08	VII	6.41	VII	9.00	VII	6.95
5	VIII	4.95	VIII	6.44	V	4.11	VIII	6.17
6	VI	3.96	VI	4.83	VIII	4.11	VI	3.74
7	V	3.54	IV	3.22	XIX	3.60	IV	3.32
8	XIX	3.38	XIX	2.99	VI	3.47	XIX	3.12
9	IV	2.97	V	2.53	IV	2.83	V	2.64
10	XVIII	2.39	X	2.53	XVII	2.44	X	2.42
Percent of type-determined cases		73.05		72.89		73.26		72.67

Table 8.—*Rank of leading types of pneumococci in the pneumonias in 6 representative States*—Continued

ILLINOIS

Rank order	2 years		First year		Second year		First year adjusted	
	Type	Percent	Type	Percent	Type	Percent	Type	Percent
1	I	19 40	I	24.68	I	16 95	I	24 05
2	III	13 61	III	12 22	III	14 25	III	12 19
3	II	10 15	II	11 94	II	9 32	II	10 82
4	VII	8 27	VII	8.91	VII	7 98	VII	8.67
5	VIII	6 65	VIII	6 48	VIII	6 73	VIII	5 97
6	IV	4 25	IV	4.12	VI	4 77	IV	4 26
7	VI	4 11	XIX	2 85	IV	4 31	XIX	3 31
8	XIX	3 48	V	2.78	XIX	3 78	VI	3 22
9	V	3 28	VI	2.68	V	3 51	XIV	3 10
10	XIV	3.06	XIV	2 29	XIV	3 42	V	2.60
Percent of type-determined cases		76 26		78 95		75 02		78 19

LOUISIANA

Rank order	2 years		First year		Second year		First year adjusted	
	Type	Percent	Type	Percent	Type	Percent	Type	Percent
1	I	22 19	I	27 51	I	16 64	I	27 11
2	VII	10 64	VII	10 06	VII	11 25	VII	9.95
3	>XXXIII	7 02	III	6 95	>XXXIII	10 17	III	7 08
4	III	6 72	VIII	5 92	V	8 17	VIII	6 05
5	V	6 57	XIX	5 33	XIX	6 63	XIX	5.52
6	XIX	5.96	V	5.03	III	6 47	V	4.95
7	VIII	5.89	XIV	4 73	VIII	5 86	XIV	4 66
8	XIV	4 83	VI	3.99	XIV	4 93	VI	4.05
9	VI	4 15	>XXXIII	3 99	IV	4 47	IV	3 72
10	IV	4 08	IV	3.70	VI	4 31	XV	2 28
Percent of type-determined cases		78 05		77 21		78.90		75 37

Rank order	2 years		First year		Second year		First year adjusted	
	Type	Percent	Type	Percent	Type	Percent	Type	Percent
1	I	18 95	I	19.29	I	18 59	I	19 05
2	III	13 68	III	13 17	III	14 21	III	14 37
3	VIII	8 79	VIII	9 51	VIII	8 01	VIII	10 48
4	VII	6 32	IV	6 02	VII	6 62	VII	6 18
5	IV	6 00	VII	6 02	IV	5.98	V	6 15
6	V	5 58	V	5 91	II	5 45	IV	5 68
7	II	4 68	VI	5.19	V	5 24	VI	4.33
8	VI	3 95	XIX	4 05	XIX	3 63	II	4 00
9	XIX	3 84	II	3.94	XIV	3.53	XIX	3.33
10	XIV	3 26	XIV	3.01	VI	2 67	XIV	2.26
Percent of type-determined cases		75.05		76.14		73.93		75.83

TABLE 8.—*Rank of leading types of pneumococci in the pneumonias in 6 representative States*—Continued

NEW JERSEY

Rank order	2 years		First year		Second year		First year adjusted	
	Type	Percent	Type	Percent	Type	Percent	Type	Percent
1	I	20.28	I	20.46	I	20.02	I	19.94
2	III	13.94	III	11.90	III	16.74	III	12.71
3	VIII	9.12	VIII	8.89	VIII	9.43	VIII	9.23
4	VII	7.50	VII	7.05	VII	8.12	VII	7.14
5	IV	5.14	IV	4.96	IV	5.40	IV	4.85
6	V	4.31	V	4.81	XIV	3.78	V	4.71
7	XIV	4.08	XIV	4.30	V	3.63	II	4.21
8	II	3.83	II	4.15	XIX	3.38	XIV	3.95
9	VI	3.63	VI	3.93	II	3.38	VI	3.88
10	XIX	3.08	XIX	2.87	VI	3.23	XIX	2.73
Percent of type-determined cases		74.91		73.32		77.11		73.35

SUMMARY

A State-Federal cooperative study was made over a 2-year period ended September 30, 1940, of the prevalence of pneumococci and other pneumoniogenic organisms in three States of very high pneumonia and influenza mortality, and in three States of relatively low pneumonia and influenza mortality. Each State, or area, represented a larger region of correspondingly high or low mortality. The study was intimately associated with the concurrent development of pneumonia control programs.

The arrangements which were made to insure uniformity in technical procedures and in the interpretation of results are described, as are the precautions taken to insure the utmost attainable reliability by a comprehensive system of performance checks.

The results of the examination of 37,782 laboratory specimens from 30,455 patients are tabulated and described. A more refined analysis and a consideration of the significance of the findings in the epidemiology of the pneumonias have been reserved for a separate publication.

The incidence of the various types of pneumococci and of other etiologic organisms in the pneumonias and the other respiratory diseases is shown for the six States by diagnostic categories. The leading types of pneumococci are indicated for each of the study areas. Over three-fourths of all pneumonias were found to be caused by pneumococci.

A comparison of the distribution of pneumococci in the several study areas shows that although there were differences as between regions, the relative prevalence of type organisms remained constant in each area from one year to the next.

During the 2-year period of the study, three-fourths of all pneumococcic pneumonias were caused by 10 types of pneumococci. These 10 most prevalent types were identical in each of the two study years. It is suggested that this observation might support a revision of current pneumococcus typing procedures in the direction of their simplification.

A STRAIN OF ENDEMIC TYPHUS FEVER VIRUS ISOLATED FROM HOUSE MICE (*MUS MUSCULUS MUSCULUS*) [1]

By GEORGE D. BRIGHAM, *Associate Bacteriologist*, and EDGAR G. PICKENS, *Scientific Aide, United States Public Health Service*

The virus of endemic typhus fever has been recovered repeatedly from the brains of rats in areas where this disease has been established. However, Mooser, Ruiz Castaneda, and Zinsser (*1*) in 1931, Lépine (*2*) in 1934, Lépine and Lorando (*3*) in 1936, and Zia (*4*) in 1938 (reported by Liu and Zia) failed to recover the virus from the brains of mice although the mice were trapped in infected foci. On the other hand, the endemic virus has been isolated from mice: Sparrow (*5*) in 1935 isolated 2 strains from 300 house mice in Tunis; Brigham (*6*) in 1937 isolated one strain from a native field mouse in Alabama, and Liu and Zia (*4*) in 1941 isolated one strain from 4 house mice in North China.[2] The authors can now report also having recovered the endemic typhus fever virus from house mice (*Mus musculus musculus*).

For a 6-month period starting in July 1941 a total of 248 house mice trapped in a control testing project[3] were utilized in an endeavor to recover the endemic typhus virus. Only the mice caught alive were employed. Their brains were pooled in groups of three to eight for inoculation. A strain was isolated from a pool of the brains of seven mice trapped in September. No attempts were made to test fleas from these mice. Rats caught in this area have been found infected with endemic typhus virus.

The mouse strain was identified as endemic typhus virus by passage through 28 guinea pig generations, 60 guinea pigs being employed. Fifty-eight of these animals developed clinical endemic typhus with scrotal reactions, one developed fever only, and one died of a secondary infection. Cross-immunity with three known endemic typhus fever strains was demonstrated and rickettsiae were found in smears

[1] From the Typhus Research Laboratory, Savannah, Ga., Division of Infectious Diseases, National Institute of Health.

[2] A paper by N. Petrov, "Epizootic of typhus among domestic mice in city of Tighina," (Misc. med. romana, 13: 195-199, March-April 1940) is not available to us.

[3] Acknowledgment for trapping the mice is made to the Typhus Fever Control Testing Project, sponsored by the City of Savannah Health Department and the Georgia State Health Department, with the cooperation of the Work Projects Administration and United States Public Health Service.

from the tunica vaginalis of the passage guinea pigs. Dr. T. L. Perrin, of the Division of Pathology, reported finding characteristic typhus lesions in the brains of three passage guinea pigs. Eight white rats inoculated with the mouse strain produced agglutinins for Proteus OX 19.

REFERENCES

(*1*) Mooser, H., Ruiz Castaneda, M., and Zinsser, H.: Rats as carriers of Mexican typhus fever. J. Am. Med. Assoc., **97**: 231–232 (July 25, 1931).
(*2*) Lépine, P.: Absence habituelle du typhus murin chez les souris capturées à Athènes. Compt. rend. soc de biol., **117**: 848–849 (1934).
(*3*) Lépine, P., and Lorando, N.: Étude d'un foyer de typhus endémique d'origine murine. Bull. Soc. Path. Exot., **29**: 285–295 (March 1936).
(*4*) Liu, W. T., and Zia, S. H.: Studies on the murine origin of typhus epidemics in North China. II. Typhus rickettsia isolated from mice and mouse-fleas during an epidemic in a household and from body lice in the garments of one of the epidemic cases. Am. J. Trop. Med., **21**: 605–625 (September 1941).
(*5*) Sparrow, H.: Enquête sur la présence du virus typhique chez les souris de Tunis. Arch. Inst. Pasteur de Tunis, **24**: 435–460 (1935).
(*6*) Brigham, G. D.: A strain of endemic typhus fever isolated from a field mouse. Pub. Health Rep., **52**: 659–660 (May 21, 1937).

GROWTH MEASUREMENTS OF *ANOPHELES QUADRIMACULATUS* LARVAE

By Frederick L. Knowles, *Biophysicist, United States Public Health Service*

In the course of our studies on the effect of temperature, food, and other factors on the growth of *A. quadrimaculatus* larvae, we have measured the width of head and total length of several hundred larvae during each of their four instars. The width of head was chosen because it remains practically constant throughout each instar. In some instances the only method of distinguishing adjacent instars is by measurements of the width of head. Measurements of the total length are an index of overall growth and vary more than measurements of the width of head.

Boyd (*1*) says, "The newly emerged larva is somewhat more than a millimeter in length, with a disproportionately small head and narrow thorax as compared with the mature larva. It may attain a length of 2 mm. The second stage may attain a length of from 3 to 4 mm. passing to 5 or 6 in the third stage, while well-nourished fourth-stage anophelines may attain 8 mm. in length."

Measurements have been made of the head width and total length of *A. quadrimaculatus* larvae from the laboratory insectary. The colony of mosquitoes in our insectary are the Boyd strain and was started with eggs of mosquitoes from the Tennessee Valley Authority insectary. The insectary is maintained at 75°–76° F. Larvae are grown in pans containing tap water and to assure an ample food

supply, pulverized duck chow is sprinkled over the surface of the water daily.

Measurements of random samples were made using a micrometer disc which was calibrated with a stage micrometer ruled to 0.01 mm. The results of the measurements are summarized in table 1.

TABLE 1.—*Mean values of head width and total length of* A. quadrimaculatus *larvae during each of their four instars*

Instars	Number of measurements	Mean width of head in millimeters	Standard deviation	Mean total length of larvae in millimeters	Standard deviation
I	145	0.166±0.0004	0.004	1.272±0.0096	0.115
II	153	.265± .0007	.008	2.096± .0069	.085
III	174	.437± .0013	.018	3.015± .029	.382
IV	174	.709± .002	.021	6.226± .034	.448

Acknowledgement is made of the assistance of Under Scientific Helper Ernest E. Livingston in making the measurements.

Values shown in table 1 for mean total lengths of larvae for the four instar periods are somewhat less than those given by Boyd. However, values of length vary during each instar and, probably, depend to some extent on the kind and amount of food and other environmental conditions.

Wigglesworth (*2*), in discussing moulting and growth, mentions two empirical laws of growth: Dyar's rule and Przibram's rule. Dyar's rule implies that changes in linear dimensions from one instar to another follow a geometrical progression. According to Przibram's rule, "The weight is doubled during each instar and at each moult all linear dimensions are increased by the ratio 1.26 or $\sqrt[3]{2}$." Wigglesworth states that agreement with this rule is often so inexact that it becomes of no practical value. Bodenheimer (*3*) in summarizing growth measurement notes these disagreements and modifies Przibram's rule by stating that during each apparent instar the weight increases by a factor of 2 or $n.2$ and linear dimensions by $\sqrt{2}$ or $n. \sqrt{2}$.

By plotting against the number of instars the logarithm of both the width of the head and the total length, as in figure 1, straight lines may be fitted to both sets of values. Straight lines for the head width and total length have the formulae $W=0.164e^{0.49(n-1)}$ for the head width and $L=1.272e^{0.49(n-1)}$ for the total length, where n is the instar period (1, 2, 3, 4). Growth as shown by these measurements increases in a geometric progression with a ratio of approximately $e^{0.49}=1.63$, which is in conformity with Dyar's rule. Since both the width of the head and the total length of the larvae have the same growth ratio, there is some indication of "harmonic" growth as opposed to "heterogenic" growth.

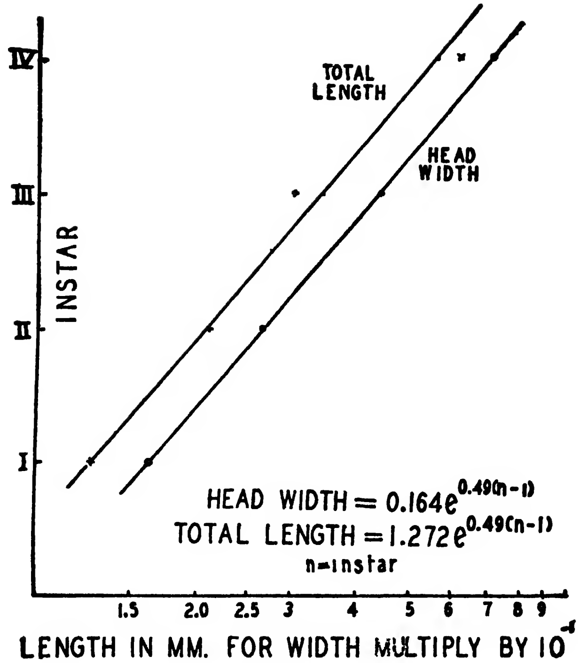


FIGURE 1

If we can presume, as Bodenheimer has done, that besides the four evident instar periods there may exist other latent divisions, approximate agreement with Przibram's rule is obtained for measurements of the width of head as shown in table 2.

TABLE 2.—*Comparison of observed and calculated means of head width and total length, showing conformity with the modified Przibram's rule*

Instar	Width of head in millimeters		Percent deviation	Ratio	Total length in millimeters		Percent deviation	Ratio
	Observed mean	Calculated mean			Observed mean	Calculated mean		
I	0 166	0 164	1 2		1.272	1 272	0	
Latent division		209		1 274		1 625		1 278
II	265	267	0 8	1 278	2 096	2 078	0 9	1.279
Latent division		342		1 281		2 650		1.275
III	.437	437	0 0	1 278	3 015	3 390	12.0	1.279
Latent division		558		1.277		4 330		1.277
IV	709	714	0 7	1.280	6 226	5 530	11.0	1.277
Average ratio				1 278				1.278

In table 2, in addition to the four actual instars, three latent instars are indicated. The ratio of the width of head and total length of one instar to the adjacent instar is approximately 1.278 which is very close to the value $1.26=\sqrt[3]{2}$ and is in accordance with Przibram's rule.

SUMMARY

Mean values are given for both the width of head and total length of *A. quadrimaculatus* larvae during each of their four instars.

Measurements show that *A. quadrimaculatus* larvae conform with Dyar's rule and have a growth ratio of approximately 1.635.

Conformity with a modified Przibram's rule is shown for width of the head and total length.

REFERENCES

(*1*) Boyd, Mark F.: An Introduction to Malariology. Harvard Univ. Press, Cambridge, 1930.
(*2*) Wigglesworth, V. B.: The Principles of Insect Physiology. Methuen, London, 1938.
(*3*) Bodenheimer, F. S.: The progression factor in insect growth. Quart. Rev. Biol., 8: 92–95 (1933).

MOUSE PROTECTIVE VALUES OF ANTIMENINGOCOCCUS SERUM IN COMPARISON WITH PRECIPITATION IN IMMUNE SERUM AGAR PLATES[1]

By MARGARET PITTMAN, *Bacteriologist, United States Public Health Service*

In 1938, Pittman, Branham, and Sockrider (*1*) reported that a definite correlation existed between the type-specific precipitins as estimated by the "plate" method and the mouse protective activity of the majority of antimeningococcus serums that they had studied. At that time a relatively small number of serums had been examined. The study was continued and in the present paper the results of the examination of 100 consecutive serums with reference to Group I antibodies are given. This larger number gives a better opportunity to determine the percentages of agreement or disagreement of the values of the serums as estimated by the two procedures.

In the previous report the results of the mouse protection tests were calculated by the method described by Reed and Muench (*2*). The same method was employed in this report and also a method described by White (*3*). The values obtained by the two methods were compared with each other as well as with the plate precipitation reaction of the corresponding serum.

The Reed-Muench method of estimating the mouse protective value of a serum is based upon the calculation of the dilution of serum that would protect 50 percent of the mice. The method described by White employs the formula $\frac{X}{Y}\left(a+a\frac{(S-S')}{N}\right)$. X=largest amount of control serum injected, Y=largest amount of unknown serum injected, a=units per ml. in control serum, S=number of mice surviving on

[1] From the Division of Biologics Control, National Institute of Health.

unknown serum, S'=number of mice surviving on control serum, and N=total number of mice injected with all dilutions of any one serum.

The details of the procedures for the mouse protection test and for the plate precipitation test were described recently by Branham and Pittman (*4*). Both the protective and the precipitative values were estimated from the results of tests in relation to the findings obtained in similar tests which were carried out at the same time with the control serum M19. The Group I culture No. 1027 was used for each test. The serums labeled antimeningococcic serum, polyvalent, were either submitted by manufacturers for approval for release or collected on inspection. All were from horses. Two or more mouse protection tests were carried out on the majority of the serums.

In table 1 are summarized the results of the comparison of the mouse protective values of the serums as calculated by the two methods It may be seen that the two values obtained for 69 of the 100 serums were within 10 percent of agreement with each other. For the remaining 31 serums there was considerable difference in the two values Assuming that the value which more nearly corresponded to the amount of precipitation was the co ect one, then the Reed-Muench value would have been correct for 25 of the serums and the White value correct for 6. Of the latter 6 for which the Reed-Muench value seemed to be incorrect, 5 were 14 to 45 percent too high and 1 was 12 percent too low. Of the 25 serums for which the White value seemed to be incorrect, 11 were 12 to 75 percent too high and 14 were 12 to 48 percent too low.

TABLE 1.—*Comparison of values of antimeningococcus serums calculated by the methods of Reed-Muench and White*

Number of serums	Agreement [1] of values obtained by both methods	Disagreement			
		White value agrees with plate precipitation		Reed-Muench value agrees with plate precipitation	
		Reed-Muench value		White value	
		Above	Below	Above	Below
100	69	3 (14-19%) 2 (40-45%)	1 (12%)	5 (12-20%) 3 (21-26%) 1 (36%) 2 (50-75%)	8 (12-20%) 4 (27-32%) 2 (41-48%)
		5	1	11	14
Total	69	6		25	

[1] Agreement within 10 percent

In table 2 is given the summary of the relation of the plate precipitation reaction with the mouse protective value of each of the 100 serums. With 94 serums there was a definite correlation between the

amount of precipitation and the mouse protective value obtained by one or both methods of calculation, while with the remaining 6 there was disagreement. In the latter instances the 2 mouse protection values for each of 5 of the 6 serums were similar. For 2 of the 6 serums, the mouse protection value was only one-half of that which would have been expected from the amount of precipitation. The converse was true for the other 4 serums, that is, the mouse protective value was twice as great as would have been expected from the plate precipitation reaction.

TABLE 2.—*Relation of plate precipitation reactions and mouse protective values of 100 antimeningococcus serums*

Number of serums	Agreement of precipitation with one or both mouse protective values	Disagreement of precipitation with both mouse protective values [1]
100	94	6 {2 mouse protection equals one-half precipitation 6 {1 [2] mouse protection equals two times precipitation

[1] The Reed-Muench and White values of 5 serums were similar
[2] White value of 1 serum was 16 percent lower than the Reed-Muench value

In each of the tables it was recorded that there were 6 serums, or a total of 12, of which the Reed-Muench calculated mouse protective value did not agree with the amount of plate precipitation. A total of 31 White values failed to correspond. In other words, 88 percent of the values calculated by the Reed-Muench method were in agreement with the amount of precipitation while only 69 percent of the value calculated by the White method were in similar agreement.

Taking the mouse protective values as a whol , however, it appears that with 94 percent of the serums there was probably a definite correlation in the mouse protective value with the amount of plate precipitation of the Group I antibodies in antimeningococcus serums. Because of this high correlation, the plate precipitation test is of very great value both in determining the approximate dilutions of serum to be employed in the mouse protection test and in evaluating the results of the mouse protection test in the performance of which so many variables are encountered. The fact, however, that a few serums show a greater or lesser amount of precipitable antibodies than can be correlated with the mouse protective activity necessarily limits the use of the plate precipitation test.

SUMMARY

A comparison of the precipitation reaction in immune serum agar plates with the protection of mice by antimeningococcus serum was made with 100 serums. Only the work with Group I meningococcus is reported. Two methods were used in calculating the results of

the mouse protection test. The values obtained by the 50 percent endpoint determination described by Reed and Muench gave a higher degree of correlation than did the value obtained by the formula described by White.

With 94 of the serums a definite correlation was found in the amount of precipitation and the mouse protection value. With 2 serums the mouse protection activity was only one-half of that expected from the plate precipitation, while the converse was true with the remaining 4.

REFERENCES

(1) Pittman, M., Branham, S. E., and Sockrider, E. M.: A comparison of the precipitation reaction in immune serum agar plates with the protection of mice by antimeningococcus serum. Pub. Health Rep., 53: 1400–1408 (1938).
(2) Reed, L. J., and Muench, H.: A simple method of estimating fifty percent endpoints. Am. J. Hyg., 27: 493–497 (1938).
(3) White, B.: Biology of the Pneumococcus. The Commonwealth Fund. New York, 1938, p. 657.
(4) Branham, S. E., and Pittman, M.: A recommended procedure for the mouse protection test in evaluation of antimeningococcus serum. Pub Health Rep., 55: 2340–2346 (1940).

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

December 6, 1942–January 2, 1943

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the Public Health Reports under the section, "Prevalence of disease." The table gives the number of cases of these diseases for the 4-week period ended January 2, 1943, the number reported for the corresponding period in 1941, and the median number for the years 1937–41.

DISEASES ABOVE MEDIAN PREVALENCE

Meningococcus meningitis.—The incidence of this disease continued at a relatively high level, the 485 cases reported for the 4 weeks ended January 2, 1943 being about 3.3 times the normal seasonal expectancy (143 cases). Each section of the country contributed to the increase, but the largest excesses over the median incidence were reported from the Atlantic and Pacific coast regions. In the New England and Pacific regions the number of cases was more than 7 times the 1937–41 median figure, while in other regions the excesses ranged from almost twice the median in the West North Central and West South Central regions to almost 4½ times the median in the Mountain region. After reaching a relatively high peak in 1936, this disease declined rapidly

until the beginning of 1941; since then the disease has been more prevalent again and the total number of cases for the year 1942 was about 40 percent above the preceding 5-year average incidence. During 1942 the disease was most prevalent in the regions along the Atlantic coast and the Pacific region, but practically all regions have contributed to the excess.

Measles.—The number of cases (18,855) of measles was considerably above the median expectancy in the North Atlantic, Mountain, and Pacific regions, but the South Atlantic, North Central, and South Central regions reported a relatively low incidence. For the country as a whole the incidence was about 10 percent higher than in 1941, but it compared very favorably with the seasonal estimated expectancy.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—The incidence of diphtheria reached a new low level for this season of the year. For the 4 weeks ended January 2, 1943 there were 1,258 cases reported, as compared with 1,830 in 1941 and a median of 2,356 cases for the corresponding period in 1937–41. In the Pacific region the incidence stood at about the median level, but in all other regions the numbers of cases were relatively low.

Influenza.—The number of cases of influenza rose from approximately 7,000 cases during the preceding 4-week period to 10,734 for the current period. The incidence was, however, about 10 percent below the 1941 incidence, which figure (11,034 cases) also represented the 1937–41 median incidence for the period. The highest incidence was still confined to the South Atlantic, West South Central, and Mountain regions. Of the total number of cases, Texas reported 3,682; South Carolina 1,855; Virginia 1,419; Arizona 385; and Wyoming 319 cases—a total of 7,660 cases, or about 70 percent of the total cases.

The average mortality rate from all causes in large cities, based on data received from the Bureau of the Census, rose from 12.4 per 1,000 for the 4 weeks ended December 5 to 13.2 for the 4 weeks ended January 2, 1943. By weeks the rates were 13.0, 13.2, 12.3, and 14.1, respectively. As there was an increase in the number of cases of influenza during the month of December, it may be assumed that part at least of the excess death rate was due to respiratory diseases. (See Mortality, all causes.)

For the 4 weeks ended January 9, the latest data available, there were 3,822 cases of influenza reported as compared with 3,440 for the preceding 4-week period, and 10,709 deaths from all causes in large cities as compared with 10,222 for the 4 weeks ended January 2, 1943.

Poliomyelitis.—During the current period there were 214 cases of poliomyelitis reported, as compared with 251, 260, and 265 for the

corresponding period of 1941, 1940, and 1939, respectively. While the situation for the country as a whole was most favorable, the North Atlantic, West South Central, Mountain, and Pacific regions reported significant increases over the 1937–41 median figures for this period. Texas reported 71 cases, California 33, New York 10—a total of 114 cases occurred in those 3 States.

Scarlet fever.—The incidence of this disease was the lowest on record for this period. The number of cases (10,979) was about 95 percent of the number reported in 1941, and it was only about 75 percent of the 1937–41 median incidence for the same period. The New England and Mountain regions reported excesses over the normal seasonal expectancy, but in all other regions the incidence was relatively low.

Smallpox.—The number of cases of smallpox rose from 49 during the preceding 4-week period to 112 for the 4 weeks ended January 2, 1943. Of the total cases, Pennsylvania reported 34, Ohio and Indiana 18 each, and Texas 10—about 75 percent of the cases occurred in those 4 States. Sometime about the middle of November a person from Ohio with an active case of this disease attended a wedding in an Amish settlement in Pennsylvania and, according to special reports, by the end of December there were 55 cases reported, 9 of which occurred in Lewistown, Mifflin County, and 33 in Lancaster. The disease apparently was of a mild type, but vaccination proceedings were started at once. In 1941 the total cases reported for this period was 70, which was the lowest incidence on record for the period, the 1937–41 median for this period was 414 cases.

Typhoid and paratyphoid fever.—Typhoid fever was also relatively low, 251 cases being reported for the current period as compared with 414 for the corresponding period in 1941 and a 1937–41 median of 473 cases. In the New England, West North Central, and East South Central regions the incidence was about normal for this season of the year, but in other regions the disease was considerably less prevalent than in preceding years.

Whooping cough.—The number of cases (11,979) of whooping cough was approximately 90 percent of the 1941 figure for this period and about 80 percent of the 1937–41 median incidence. Of the 9 geographic regions, the New England, West North Central, West South Central, and Pacific regions reported excesses over the median, the East South Central region about the normal seasonal incidence, and in the Middle Atlantic, East North Central, South Atlantic, and Mountain regions the number of cases was below the seasonal expectancy.

MORTALITY, ALL CAUSES

The average mortality rate from all causes in large cities for the 4 weeks ended January 2, 1943, based on data received from the Bureau of the Census, was 13.2 per 1,000 inhabitants (annual basis),

an increase over the preceding 4-week period of approximately 7 percent. The current rate also represented an increase of almost 10 percent over the preceding 3-year average rate for the corresponding period. The recent increase in the death rate does not appear to be confined to any one locality. An increase in the number of cases of influenza for the country as a whole and also an increase in the mortality from influenza and pneumonia in cities reporting this information to the Public Health Service would indicate that the respiratory diseases are responsible for a large part of the increase. However, these rates are based on the April 1940 population and the lack of accurate current urban populations and possible changes in the age distribution are as yet undetermined factors in the current rates.

Number of reported cases of 9 communicable diseases in the United States during the 4-week period December 6, 1942–January 2, 1943, the number for the corresponding period in 1941, and the median number of cases reported for the corresponding period, 1937–41

Division	Current period	1941	5-year median	Current period	1941	5-year median	Current period	1941	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	1,258	1,830	2,356	10,734	11 034	11,034	18,855	17,320	18,196
New England	18	34	34	21	12	21	3,661	1,919	1,435
Middle Atlantic	131	137	271	121	82	97	6,233	3,699	3,699
East North Central	168	260	378	341	310	404	1,655	1,259	1,836
West North Central	88	94	135	151	157	316	1,100	1 427	1,427
South Atlantic	261	516	574	3,755	2,638	2,638	226	3,133	1,942
East South Central	136	212	246	662	485	1,415	224	603	603
West South Central	272	425	401	4,444	6,124	3,076	434	1,463	470
Mountain	68	75	80	1,002	808	851	2,464	1,384	857
Pacific	116	77	115	237	418	418	2,858	2,433	2,433
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	485	143	143	214	251	251	10,979	11,281	14,672
New England	68	19	9	5	25	2	1,390	1,250	858
Middle Atlantic	109	33	33	18	56	12	2,122	2,387	2,610
East North Central	54	16	16	18	32	23	3,114	3,351	4,702
West North Central	21	13	11	19	17	23	1,190	1,323	1,852
South Atlantic	97	21	25	15	26	24	1,080	1,297	1,168
East South Central	11	19	19	10	51	18	479	773	730
West South Central	23	13	13	75	20	20	315	388	442
Mountain	31	8	7	15	5	5	640	402	500
Pacific	71	6	10	39	19	19	649	650	885
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	112	70	414	251	414	473	11,979	13,465	[3] 14,356
New England	0	0	0	16	23	18	1,826	1,326	1,454
Middle Atlantic	34	0	0	25	63	69	3,266	3,801	4,113
East North Central	44	18	79	84	65	65	3,076	3,987	3,748
West North Central	10	24	165	27	14	26	559	541	503
South Atlantic	4	1	3	39	104	90	898	1,126	1,358
East South Central	4	6	3	32	31	31	391	401	391
West South Central	14	16	57	48	67	115	740	456	422
Mountain	2	2	111	21	13	32	331	686	448
Pacific	0	3	20	13	34	34	892	1,141	887

[1] Mississippi, New York, and Pennsylvania excluded, New York City included.
[2] Mississippi excluded.
[3] 4 years (1938–41) only.

DEATHS DURING WEEK ENDED JANUARY 9, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Jan. 9, 1943	Corresponding week 1942
Data from 90 large cities of the United States:		
Total deaths	10,709	9,849
Average for 3 prior years	9,840	
Deaths under 1 year of age	784	618
Average for 3 prior years	589	
Data from industrial insurance companies		
Policies in force	65,266,075	64,833,337
Number of death claims	12,793	11,660
Death claims per 1,000 policies in force, annual rate	10.2	9.4

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 16, 1943

Summary

Meningococcus reports for the week ended January 16 totaled 298 cases as compared with 278 for the preceding week and a 5-year (1938–42) median of 46. The largest numbers were reported in States as follows, with figures for the preceding week in parentheses: California, 30 (13); Missouri, 25 (7); New York, including 15 in New York City, 23 (23); Virginia, 20 (30); Maine, 19 (16); Pennsylvania, South Carolina, and Oregon, 16 each, and Washington, 14.

A total of 4,330 cases of influenza was reported, as compared with 3,852 for the preceding week and a 5-year median of 3,894, reported for the corresponding week in 1942. The number for the week in 1941 was 95,695. Of the current total, 68 percent was reported in the 3 States heretofore reporting the greatest prevalence, Texas 1,582, South Carolina 854, and Virginia 489.

Reports of poliomyelitis for the week totaled 46 cases as compared with 34 last week and a 5-year median of 29. The current total is above that reported for the corresponding week of any year since 1932 and includes 9 cases in Texas, 7 in California, 4 in Michigan, and 3 each in New York and Kansas.

The number of smallpox cases reported decreased from 42 to 39 for the current week, 13 of which were in Indiana, 10 in Pennsylvania, and 6 in Ohio. The corresponding 5-year median is 110.

The total number of measles cases reported for the week, 8,225, is only slightly above the preceding week's figure of 8,182, and is 17 percent less than the comparable 5-year median. The highest prevalence is in the Middle Atlantic, New England, Pacific, and East North Central States, in the order named.

The reported numbers of cases of diphtheria, scarlet fever, and typhoid fever are below the respective 5-year medians, although a slight increase over the preceding week was shown for scarlet fever.

Whooping cough figures are slightly above those for both the preceding week and the 5-year median.

Other reports for the week include 201 cases of dysentery (17 amebic, 141 bacillary, and 43 unspecified); 12 cases of infectious encephalitis; 14 cases of tularemia, and 70 cases of typhus fever.

For the current week deaths in 90 large cities of the United States aggregated 10,316; for the preceding week, 10,709. The 3-year average (1940–42) is 9,678. The accumulated figures for the first 2 weeks are: 1943, 21,022; 1942, 19,656. (NOTE.—Rates have been discontinued owing to the lack of accurate urban population estimates.)

Telegraphic morbidity reports from State health officers for the week ended January 16, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	Jan. 16, 1943	Jan. 17, 1942		Jan. 16, 1943	Jan. 17, 1942		Jan. 16, 1943	Jan. 17, 1942		Jan. 16, 1943	Jan. 17, 1942	
NEW ENG.												
Maine	0	0	3	------	1	7	16	187	70	19	2	0
New Hampshire	0	0	0	------	------	------	173	8	8	0	0	0
Vermont	0	0	0	------	------	------	304	14	14	0	0	0
Massachusetts	2	0	3	------	------	------	450	236	236	12	3	1
Rhode Island	2	5	0	------	------	------	9	40	5	20	0	0
Connecticut	0	0	0	4	2	6	358	146	146	4	2	1
MID. ATL.												
New York	16	24	25	[1] 22	[1] 14	[1] 14	852	348	389	23	5	5
New Jersey	8	2	7	26	10	18	331	112	112	8	1	1
Pennsylvania	19	12	28	2	------	------	1,841	1,463	1,463	16	4	4
E. NO. CEN.												
Ohio	15	4	28	14	35	35	61	84	84	0	2	1
Indiana	12	14	16	8	26	25	152	31	31	2	1	1
Illinois	7	28	37	11	21	28	176	89	89	5	4	4
Michigan [2]	7	4	7	5	1	2	135	88	440	3	2	1
Wisconsin	6	1	1	147	16	48	437	439	439	2	0	0
W. NO. CEN.												
Minnesota	4	5	4	2	2	2	14	177	177	0	0	0
Iowa	10	0	6	------	------	5	44	134	134	0	0	0
Missouri	5	5	14	10	5	59	46	54	40	25	2	0
North Dakota	0	0	0	46	13	13	8	85	11	0	1	0
South Dakota	1	2	2	------	2	1	162	9	6	1	0	0
Nebraska	7	1	3	28	------	------	140	11	10	1	0	0
Kansas	4	12	11	4	16	32	68	165	148	8	0	0
SO. ATL.												
Delaware	0	2	2	------	------	------	2	2	2	0	0	0
Maryland [2]	12	4	6	22	10	15	10	177	12	10	10	0
Dist. of Col.	1	3	3	4	1	2	13	8	7	4	0	0
Virginia	11	11	21	489	348	420	79	141	168	20	3	3
West Virginia	8	7	14	14	11	37	7	189	189	1	0	0
North Carolina	11	16	25	17	8	26	14	451	434	3	2	2
South Carolina	2	11	7	854	403	673	5	122	70	16	0	1
Georgia	2	7	13	157	93	136	13	259	72	2	0	0
Florida	4	4	5	------	14	14	3	45	45	1	0	0
E. SO. CEN.												
Kentucky	11	5	15	15	6	61	197	26	26	7	1	2
Tennessee	4	5	7	63	92	184	16	98	74	6	1	3
Alabama	8	18	15	265	281	300	11	27	68	8	2	3
Mississippi [2]	9	8	8	------	------	------	------	0	------	0	2	1
W. SO. CEN.												
Arkansas	11	16	16	158	212	212	57	127	30	4	0	0
Louisiana	5	10	13	9	4	36	26	20	2	3	1	1
Oklahoma	8	13	14	67	116	149	52	129	15	2	0	0
Texas	35	60	57	1,582	1,561	895	63	650	216	5	7	2
MOUNTAIN												
Montana	1	0	1	7	8	17	26	59	11	0	0	0
Idaho	0	4	1	1	5	5	81	10	10	0	0	0
Wyoming	0	0	1	36	36	24	8	22	8	2	1	0
Colorado	15	9	12	46	68	68	78	322	108	2	0	1
New Mexico	0	1	2	4	4	4	1	120	120	1	0	0
Arizona	2	0	4	83	105	165	7	88	10	2	2	0
Utah [2]	1	0	0	12	1	1	374	24	27	2	1	0
Nevada	0	0	------	------	------	------	3	5	------	1	0	------
PACIFIC												
Washington	13	2	1	1	5	4	717	25	50	14	0	1
Oregon	2	0	1	27	28	39	373	65	60	16	0	0
California	29	18	18	68	160	160	212	1,135	326	30	6	1
Total	330	353	543	4,330	3,894	3,894	8,225	8,266	9,857	309	68	46
2 weeks	702	758	1,031	8,182	7,694	7,694	16,407	16,158	16,527	587	113	130

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended January 16, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	Jan. 16, 1943	Jan. 17, 1942		Jan. 16, 1943	Jan. 17, 1942		Jan. 16, 1943	Jan. 17, 1942		Jan. 16, 1943	Jan. 17, 1942	
NEW ENG.												
Maine	2	0	0	17	28	16	0	0	0	0	2	1
New Hampshire	0	0	0	9	14	8	0	0	0	0	0	0
Vermont	0	0	0	8	2	6	0	0	0	0	0	0
Massachusetts	2	0	0	366	299	191	0	0	0	0	4	2
Rhode Island	0	0	0	16	12	4	0	0	0	0	0	0
Connecticut	0	0	0	74	30	72	0	0	0	0	3	1
MID. ATL.												
New York	3	6	1	399	318	419	0	0	0	4	1	8
New Jersey	0	1	0	103	104	173	0	0	0	1	0	1
Pennsylvania	1	0	0	285	271	308	10	0	0	2	6	6
E. NO. CEN.												
Ohio	1	2	2	269	267	354	6	0	1	1	2	4
Indiana	0	0	0	83	135	150	13	1	5	2	1	1
Illinois	0	1	1	223	231	433	1	0	2	0	3	3
Michigan [2]	4	0	1	100	173	321	0	0	2	0	1	2
Wisconsin	0	0	1	336	141	141	0	0	6	0	1	0
W. NO. CEN.												
Minnesota	0	1	1	92	77	124	0	1	13	1	2	1
Iowa	1	1	0	63	30	91	2	0	13	2	2	0
Missouri	1	0	0	98	92	92	0	5	5	1	1	2
North Dakota	0	0	0	8	15	20	0	0	1	0	0	0
South Dakota	1	0	0	23	53	22	0	0	1	0	0	0
Nebraska	0	0	0	21	60	39	0	0	1	0	0	1
Kansas	3	0	0	63	93	135	0	0	2	0	0	0
SO. ATL.												
Delaware	0	0	0	5	33	17	0	0	0	0	1	0
Maryland [2]	0	0	0	66	53	53	1	0	0	8	1	1
Dist. of Col.	0	0	0	25	12	13	0	0	0	2	0	0
Virginia	1	0	0	52	32	54	0	0	0	1	5	2
West Virginia	0	0	0	28	61	66	0	0	0	1	1	2
North Carolina	1	0	0	50	49	63	0	0	0	2	0	3
South Carolina	0	0	0	19	9	9	1	0	0	0	1	1
Georgia	1	1	0	27	20	24	0	0	0	1	6	4
Florida	0	0	1	5	7	8	0	0	0	0	0	2
E. SO. CEN.												
Kentucky	2	0	1	51	70	70	0	0	0	1	0	0
Tennessee	0	1	1	58	64	57	0	0	0	0	4	2
Alabama	1	2	1	15	30	26	2	1	0	2	0	1
Mississippi [2]	0	2	0	13	8	9	0	0	0	0	1	1
W. SO. CEN.												
Arkansas	1	2	2	10	10	13	0	0	3	2	3	2
Louisiana	0	0	0	14	4	15	0	0	0	3	8	7
Oklahoma	0	0	0	8	33	39	0	1	2	2	0	2
Texas	9	1	1	59	46	61	0	0	2	0	4	8
MOUNTAIN												
Montana	0	3	0	9	42	42	0	0	0	0	0	0
Idaho	0	0	0	12	14	14	0	1	1	2	0	0
Wyoming	0	0	0	58	10	8	0	0	0	0	0	0
Colorado	0	1	0	53	38	38	0	0	15	0	1	1
New Mexico	1	0	0	1	7	14	0	0	0	0	0	1
Arizona	1	0	0	9	3	7	0	1	1	0	0	1
Utah [1]	0	0	0	90	26	26	0	0	0	0	1	0
Nevada	0	0	------	------	0	------	0	0	------	0	0	------
PACIFIC												
Washington	1	0	0	30	31	49	0	0	2	0	0	1
Oregon	1	0	0	22	14	23	3	0	3	0	1	3
California	7	4	3	192	115	161	0	0	0	0	3	2
Total	46	29	29	3,637	3,292	4,134	39	11	110	41	70	86
2 weeks	80	57	57	7,094	6,393	7,731	81	21	184	94	154	162

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended January 16, 1943—Continued

Division and State	Whooping cough			Week ended Jan. 16, 1943								
	Week ended—		Median 1938-42	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt spotted fever	Tularemia	Typhus fever
	Jan. 16, 1943	Jan. 17, 1942			Amebic	Bacillary	Unspecified					
NEW ENG.												
Maine	122	34	42	0	0	0	0	0	0	0	0	0
New Hampshire	1	3	3	0	0	0	0	0	0	0	0	0
Vermont	52	32	32	0	0	0	0	0	0	0	0	0
Massachusetts	256	202	202	0	0	1	0	1	0	0	0	1
Rhode Island	19	119	33	0	0	0	0	0	0	0	0	0
Connecticut	92	150	108	0	0	1	0	1	0	0	0	0
MID. ATL.												
New York	473	577	540	0	1	17	0	0	0	0	0	0
New Jersey	194	227	164	0	1	0	0	0	0	0	0	0
Pennsylvania	373	310	414	0	0	0	0	0	0	0	0	0
E. NO. CEN.												
Ohio	282	221	221	0	0	0	0	0	0	0	0	0
Indiana	35	59	36	0	0	0	0	0	0	0	0	0
Illinois	177	225	121	0	1	0	0	1	0	0	0	0
Michigan [2]	414	181	184	0	0	2	0	0	0	0	0	0
Wisconsin	231	201	182	0	0	0	0	0	0	0	0	0
W. NO. CEN.												
Minnesota	66	56	56	0	2	0	0	0	0	0	0	0
Iowa	30	11	12	0	0	0	0	1	0	0	3	0
Missouri	30	22	22	0	0	0	0	0	0	0	0	0
North Dakota	21	2	13	0	0	0	0	1	0	0	0	0
South Dakota	2	7	4	0	0	0	0	0	0	0	0	0
Nebraska	1	6	5	0	0	0	0	0	0	0	0	0
Kansas	48	56	56	0	0	0	0	0	0	0	0	1
SO. ATL.												
Delaware	10	1	6	0	0	0	0	0	0	0	0	0
Maryland [2]	95	84	80	0	0	0	5	0	0	0	1	0
Dist. of Col.	13	32	10	0	0	0	0	0	0	0	0	0
Virginia	90	22	53	0	0	0	19	0	0	0	1	0
West Virginia	31	24	36	0	0	0	0	0	0	0	0	0
North Carolina	85	197	284	0	0	0	0	[illegible]	0	0	0	1
South Carolina	31	66	66	0	0	1	0	0	0	0	0	7
Georgia	31	13	14	0	3	0	0	0	0	0	0	17
Florida	10	21	11	0	0	0	0	0	0	0	0	1
E. SO. CEN.												
Kentucky	55	89	14	0	0	0	0	0	0	0	3	0
Tennessee	82	32	26	0	0	0	0	2	0	0	4	1
Alabama	41	5	28	0	0	0	0	0	0	0	0	10
Mississippi [2]	------	0	------	0	0	0	0	0	0	0	0	0
W. SO. CEN.												
Arkansas	22	11	11	0	1	0	0	0	0	0	0	0
Louisiana	1	4	4	0	1	1	0	0	0	0	0	1
Oklahoma	8	6	6	0	0	0	0	0	0	0	0	0
Texas	227	88	96	0	2	109	0	1	0	0	0	30
MOUNTAIN												
Montana	27	9	9	0	0	0	0	0	0	0	0	0
Idaho	2	6	6	0	0	0	0	0	0	0	0	0
Wyoming	9	8	8	0	0	0	0	1	0	0	0	0
Colorado	22	29	28	0	0	0	0	0	0	0	0	0
New Mexico	7	10	21	0	0	1	0	0	0	0	0	0
Arizona	19	24	26	0	0	0	19	0	0	0	0	0
Utah [2]	32	24	34	0	4	0	0	0	0	0	0	0
Nevada	0	4	------	0	0	0	0	0	0	0	1	0
PACIFIC												
Washington	38	76	49	0	0	0	0	1	0	0	1	0
Oregon	6	36	24	0	0	0	0	0	0	0	0	0
California	341	182	183	0	1	8	0	2	0	0	0	0
Total	4,254	3,864	3,893	0	17	141	43	12	0	0	14	70
2 weeks	7,902	7,728	7,728	------	------	------	------	------	------	------	------	------

[1] New York City only.
[2] Period ended earlier than Saturday.

WEEKLY REPORTS FROM CITIES

City reports for week ended January 2, 1943

This table lists the reports from 84 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga	0	0	16	2	1	0	7	0	9	0	1	2
Baltimore, Md	0	0	3	1	0	10	34	0	11	0	0	47
Barre, Vt	0	0		0	2	0	0	0	0	0	0	0
Billings, Mont	0	0		0	0	0	0	0	0	0	0	2
Birmingham, Ala	0	0		0	1	1	7	0	4	0	0	0
Boise, Idaho	0	0		0	0	0	0	0	0	0	0	0
Boston, Mass	0	0		0	43	1	24	0	79	0	2	33
Bridgeport, Conn	0	0	2	0	0	0	3	0	2	0	0	0
Camden, N. J	0	0		0	15	0	1	0	3	0	0	5
Charleston, S. C	0	0	44	0	0	1	2	0	3	0	0	0
Chicago, Ill	8	0	7	8	69	4	47	0	55	0	0	87
Cincinnati, Ohio	0	0		1	12	2	8	0	24	0	0	3
Cleveland, Ohio	2	0	5	0	4	2	15	0	46	0	0	50
Columbus, Ohio	0	0	2	2	1	0	5	0	21	0	0	2
Concord, N. H	0	0		0	1	0	0	0	3	0	0	0
Cumberland, Md	0	0		0	0	0	2	0	0	0	2	0
Dallas, Tex	3	0	1	1	0	0	6	1	4	0	1	3
Denver, Colo	2	0	18	1	12	1	6	0	3	0	0	6
Duluth, Minn	0	0		0	1	0	3	0	3	0	0	0
Fall River, Mass	0	0		1	0	0	2	0	2	0	0	18
Fargo, N. Dak	0	0		0	0	0	0	0	3	0	0	0
Flint, Mich	1	0		0	1	0	0	0	3	0	0	4
Fort Wayne, Ind	0	0		0	0	0	0	0	0	0	0	0
Frederick, Md	0	0		0	0	0	1	0	0	0	0	0
Galveston, Tex	0	0		0	0	0	1	0	0	0	0	0
Grand Rapids, Mich	0	0		2	0	0	4	0	1	0	0	8
Great Falls, Mont	0	0		0	3	1	0	0	0	0	0	1
Hartford, Conn	0	0		0	2	1	7	0	0	0	0	3
Helena, Mont	0	0		0	0	0	1	0	0	0	0	1
Houston, Tex	0	0		0	0	0	7	1	5	0	0	2
Indianapolis, Ind	1	0		0	17	1	9	0	13	0	0	8
Kansas City, Mo	1	0		0	0	0	8	0	27	0	0	3
Kenosha, Wis	0	0		0	2	0	0	0	2	0	0	0
Los Angeles, Calif			17							0	1	18
Lynchburg, Va										0		0
Memphis, Tenn						1				0		9
Milwaukee, Wis					47	0				0		20
Minneapolis, Minn						0	4			0		3
Missoula, Mont						0	1			0		0
Mobile, Ala						0	3			0		0
Nashville, Tenn						0	3			0		0
Newark, N. J					27	1	14		8	0		4
New Haven, Conn						0	3		1	0		1
New Orleans, La						0	18		2	0		0
New York, N. Y						12	103		165	0		
Omaha, Nebr						0	5		3	0		1
Philadelphia, Pa						6	21		67	0		68
Pittsburgh, Pa						3	11		9	0		38
Portland, Maine						4	2		2	0		33
Providence, R. I						3	4			0		13
Pueblo, Colo						0	0			0		0
Racine, Wis						0	0			0		1
Reading, Pa						0	6			0		0
Richmond, Va						1	10			0		0

City reports for week ended January 2, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
Roanoke, Va	2	0		0	0	0	3	0	1	0	0	0
Rochester, N. Y	0	0		0	7	1	4	0	4	0	0	5
Sacramento, Calif	10	0		0	1	1	3	0	6	0	0	3
Saint Joseph, Mo	0	0		0	0	0	2	0	1	0	0	0
Saint Louis, Mo	2	0		0	0	6	13	0	7	0	1	10
Saint Paul, Minn	0	0		0	2	0	3	0	4	0	0	23
Salt Lake City, Utah	0	0		0	138	0	2	0	10	0	0	16
San Antonio, Tex	2	0	4	4	0	0	9	7	3	0	0	2
San Francisco, Calif	0	0	7	0	4	2	17	0	9	0	0	12
Savannah, Ga	0	0	2	2	0	0	3	0	1	0	0	0
Seattle, Wash	1	0		1	37	0	4	0	3	0	0	2
Shreveport, La	0	0		1	0	0	3	0	1	0	0	0
South Bend, Ind	0	0		0	0	0	0	0	2	0	0	1
Spokane, Wash	0	0	2	2	60	0	1	0	4	0	0	0
Springfield, Ill	0	0		0	1	0	0	0	4	0	0	10
Springfield, Mass				0	11	1	9	1	58	0	0	0
Superior, Wis	0	0		3	0	0	0	0	2	0	0	10
Syracuse, N. Y	0	0		0	1	1	4	0	1	0	0	26
Tacoma, Wash	0	0		0	35	0	3	0	0	0	0	0
Tampa, Fla	0	0		0	2	0	4	0	2	0	0	0
Topeka, Kans	0	0		1	9	0	0	0	2	0	0	0
Trenton, N. J	0	0	2	0	0	0	2	0	7	0	0	1
Washington, D. C	1	1	4	1	4	1	21	0	13	0	1	13
Wheeling, W. Va	0	0		0	1	0	2	0	2	0	0	3
Wichita, Kans	2	0		0	0	0	6	0	4	0	0	3
Wilmington, Del	0	0		1	3	0	2	0	2	0	0	2
Wilmington, N. C	0	0		0	0	0	2	0	0	0	0	1
Winston-Salem, N. C	0	0	2	0	0	0	3	0	0		0	2
Worcester, Mass	0	0		0	6	0	10	0	6	0	0	4

Dysentery, bacillary—Cases: Birmingham, 1, Los Angeles, 2, Nashville, 1, New York, 7.
Tularemia—Cases: New Orleans, 2, Philadelphia, 1, Pittsburgh, 1, Wichita, 1.
Typhus fever—Cases: Houston, 3, Mobile, 2, Savannah, 1

Rates (annual basis) per 100,000 population for the group of 84 cities included in the preceding table (estimated population, 1942, 31,670,947)

Period	Diphtheria cases	Influenza Cases	Influenza Deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
Week ended Jan 2, 1943	11 20	30 46	9 06	257 99	95 33	149 82	0 00	2 14	120 68
Average for week 1937-41	18 43	172 00	[1] 12 40	[2] 242 90	[1] 78 20	162.21	2.99	2.82	160.38

[1] 3-year average, 1939-41.
[2] 5-year median.

PLAGUE INFECTION IN TACOMA, WASH.

Plague infection has been reported proved in pools of fleas and in tissue from rats, all *R. norvegicus* except as otherwise stated, collected in Tacoma, Wash., as follows:

December 14, 20 fleas from 14 rats; December 18, 12 fleas from 33 rats, *R. rattus*, 26 fleas from 6 rats, *R. alexandrinus*, and 32 fleas

from 18 rats; December 19, tissue from 1 rat; December 21, 10 fleas from 15 rats, *R. rattus*, and 8 fleas from 7 rats; December 22, tissue from 39 rats; December 23, 43 fleas from 82 rats; December 24, tissue from 3 rats, proved separately; December 28, 125 fleas from 36 rats and tissue from 1 rat; December 29, tissue from 5 rats.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—During the week ended December 26, 1942, 2 rats proved positive for plague were reported in Paauhau area, Hamakua District, Island of Hawaii, T. H. During the week ended January 2, 1943, 1 rat proved positive for plague was reported in Kapulena area and 2 rats proved positive for plague were reported in Paauhau area, all in Hamakua District, Island of Hawaii, T. H.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended December 19, 1942.—During the week ended December 19, 1942, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				5	3				2	10
Chickenpox		19		363	432	104	67	13	89	1,087
Diphtheria		21	2	42	1	14	2	3	3	88
Dysentery				4						4
German measles				33	5	1		1	10	50
Influenza		41				3			19	63
Measles		4		66	84	14	33	1	27	229
Mumps	1	119		64	689	50	65	74	225	1,287
Pneumonia		17			18	2			6	43
Poliomyelitis				1	1		1			3
Scarlet fever		4	4	97	97	13	18	20	120	373
Tuberculosis	4	3	10	139	49	9		2	39	255
Typhoid and paratyphoid fever	1			17	2		1	3		24
Whooping cough		27	1	163	78	31	5	17	18	340
Other communicable diseases		12		1	176	42	2		103	336

CUBA

Provinces—Notifiable diseases—4 weeks ended December 5, 1942.—During the 4 weeks ended December 5, 1942, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	1		4	16		15	36
Cerebrospinal meningitis		1					1
Diphtheria		33	1	7	2	5	48
Hookworm disease		23					23
Malaria	218	43	2	133	12	313	721
Measles				1		23	24
Poliomyelitis		2	3	14	6	4	29
Tuberculosis	20	15	20	33	8	52	148
Typhoid fever	10	34	10	30	5	28	117
Whooping cough						1	1
Yaws						2	2

[1] Includes the city of Habana.

HAITI

Anthrax.—About the middle of December 1942, an outbreak of anthrax occurred among cattle and hogs in Kenscoff, Haiti, about 15 miles from Port-au-Prince. No human cases have been reported.

IRISH FREE STATE

Poliomyelitis.—According to a report dated November 19, 1942, a total of 39 cases of poliomyelitis was reported in Irish Free State for 1942 up to and including September 5, 1942. The numbers of cases of

poliomyelitis reported by weeks subsequent to September 5, are as follows:

Week ended—	Cases reported	Week ended—	Cases reported
Sept. 12	15	Oct. 17	20
Sept. 19	27	Oct 24	28
Sept. 26	24	Oct. 31	17
Oct 3	22	Nov 7	18
Oct. 10	28	Nov. 14	23

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during the current year. All reports of yellow fever are published currently

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Cholera

China—Shanghai.—Cholera has been reported in Shanghai, China, as follows: For the period July 19–October 3, 1942, 825 cases; week ended October 10, 15 cases; week ended October 24, 3 cases.

Plague

Ecuador—Loja.—During the week ended December 12, 1942, 1 fatal case of plague was reported in the city of Loja, Ecuador.

Smallpox

Turkey.—During the 2 weeks ended December 26, 1942, 300 cases of smallpox were reported in Turkey.

Typhus Fever

China—Shanghai.—For the period July 19 to October 10, 1942, 101 cases of typhus fever were reported in Shanghai, China.

Hungary.—For the week ended December 19, 1942, 14 cases of typhus fever were reported in Hungary.

Indochina.—For the period November 21-30, 1942, 10 cases of typhus fever were reported in Indochina.

Rumania.—For the week ended December 5, 1942, 75 cases of typhus fever were reported in Rumania. For the week ended December 12, 132 cases were reported.

Slovakia.—For the week ended December 12, 1942, 4 cases of typhus fever were reported in Slovakia.

Turkey.—For the 2 weeks ended December 26, 1942, 23 cases of typhus fever were reported in Turkey.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements, should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 58 JANUARY 29, 1943 NUMBER 5

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol. 58 • JANUARY 29, 1943 • *No. 5*

SANITATION MANUAL FOR LAND AND AIR CONVEYANCES OPERATING IN INTERSTATE TRAFFIC

A Manual for the Sanitary Control of Water Supplies, Milk and Milk Products, Eating and Drinking Facilities, Excreta Disposal, Garbage and Refuse Disposal, and other Items of Sanitation Concerned With Land and Air Conveyances (Railroad Cars, Motor Vehicles, and Airplanes) Engaged in Interstate Traffic.

This manual is designed to provide public health agencies and carriers with the necessary information upon which to base their procedures. It is requisite that each facility or procedure coming under consideration should be carefully examined with reference to its adequacy. The scope of such examination and application will vary according to the circumstances incident to the current war emergency existing in each individual case and cannot be fully specified. In general the facilities and procedures should, however, be in accordance with this sanitation manual.

This manual will be subject to periodic review and revision when indicated to be desirable for incorporation of such changes as actual experience may suggest.

ADOPTION AND PROMULGATION

UNITED STATES PUBLIC HEALTH SERVICE,
Washington, D. C., October 2, 1942.

The Public Health Service hereby adopts and promulgates this Sanitation Manual for Land and Air Conveyances Operating in Interstate Traffic.

This manual is intended for use in the administration of the interstate quarantine regulations as they relate to sanitation of water supplies, milk and milk products, eating and drinking facilities, excreta disposal, garbage and refuse disposal, and other items of sanitation.

(s) THOMAS PARRAN,
Surgeon General, United States Public Health Service.

Approved: Dec. 3, 1942.
(s) WATSON B. MILLER,
Acting Administrator, Federal Security Agency.

CONTENTS

SANITATION MANUAL FOR LAND AND AIR CONVEYANCES OPERATING IN INTERSTATE TRAFFIC

Section I. Sources of Water Furnished to Interstate Carrier Conveyances

Water used for drinking and culinary purposes on land and air conveyances operating in interstate traffic shall be of the quality prescribed by the Drinking Water Standards of the United States Public Health Service and shall be secured only from supplies approved in accordance with the procedure prescribed in the Interstate Quarantine Regulations of the United States, 1921, which provide as follows:

Water provided by any person, firm, company, or corporation for drinking or culinary purposes on any car, vessel, or other conveyance while engaged in interstate traffic shall be from a source which is approved by the Surgeon General of the United States Public Health Service as producing water of satisfactory sanitary quality and safety.

Section II. Delivery of Water to Conveyance

Water provided in the manner specified in section I of this manual shall be delivered to the land or air conveyances operating in interstate traffic in accordance with the requirements of the Interstate Quarantine Regulations of the United States, 1921, which provide as follows:

Common carriers, whether persons, firms, companies, or corporations, providing water from approved supplies shall cause such water to be handled from the source of supply to the delivery to consumers in such manner that the safety or sanitary quality of such water shall not be impaired. Water cooled for drinking purposes shall be cooled in such manner that ice cannot come into contact with such water.

ITEM 1. HYDRANTS

Water hydrants, taps, or faucets shall be properly located, constructed, and maintained to assure protection of approved drinking water against contamination.

Public health reason.—Proper location, construction, and maintenance of hydrants, taps, and faucets are essential to avoid contamination of water delivered to such fixtures from approved sources. Contamination may occur from toilet hopper discharges either directly or by splattering and from polluted surface drainage unless hydrants are protected by vertical or horizontal distance from sources of contamination and by suitable housing where the distance obtainable does not insure positive protection.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Hydrants are any one of the following:

(*a*) Overhead crane-type hydrants or "above the ground" water faucets with outlets sufficiently elevated to prevent their exposure to toilet waste discharges from conveyances or to other sources of contamination.

(*b*) Post hydrants or elevated faucets, with outlets at elevations above the point of discharge of toilet waste hoppers of conveyances and not exposed to other sources of contamination.

(*c*) Hydrants located not less than 6 feet from the center line of the nearest track positively protected against contamination by a suitable housing or hood and with the point of discharge at sufficient height above the ground or platform so as to be free from contamination by ordinary surface drainage. Housing or hood as referred to above may be interpreted to include the type of housing used in existing depressed hydrant installations, providing covers are of the overlapping type. In new track installations this type of hydrant shall be located not less than 7 feet from the center line of the nearest track.

(2) Hydrants whether of types (*a*), (*b*), or (*c*) embody certain essentials to permit satisfactory operation and prevent contamination, such as:

(*a*) Substantial and simple construction permitting quick opening of the valve, ready repairs, and maintenance in a clean condition.

(*b*) The provision of outlets of ample size to furnish an adequate quantity of water and equipped with a type of coupling permitting quick attachment or removal of the hose.

(*c*) Adequate facilities for removal of waste water. In the case of frost-proof hydrants provided with weep holes, such drainage must be provided as to prevent surface or waste water from rising to the weep hole elevation.

(*d*) Location to minimize the possibility of accidents and contamination.

(*e*) Post hydrants terminating in downward bends or goosenecks.

(3) Hydrants used for supplying drinking and culinary water to conveyances are not located in areas or places where there are other water supply facilities furnishing water of unsafe, doubtful, or unknown sanitary quality, and when hydrants located in toilet rooms, wash rooms, or similar places where danger of contamination may exist or develop are not used for watering purposes.

Hydrants located within bus garages, airplane hangars, etc., and used to supply drinking and culinary water to land and air conveyances should be protected from contamination by such precautionary

measures as may be indicated by existing conditions, as exemplified by the specifications for the protection of water buckets outlined in item 3 of this section of the manual.

ITEM 2. WATER HOSE

Hose lines used for the delivery of water from hydrants to conveyances shall be of satisfactory material, shall be properly handled and used only for this purpose. They shall be equipped with adequate protective devices. They shall not be left in gutters.

Public health reason.—Prevention of contamination of the hose is essential in order that it may deliver safe water to the conveyance. Proper construction, maintenance, and, particularly, operation are all important in preventing contamination.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Hose lines for the delivery of water from hydrants to storage tanks of land or air conveyance equipment have the following essential features:

(*a*) Suitable size and construction and proper maintenance.

(*b*) Nozzle of smooth suitable material fitting with a tight joint both the pressure and gravity water system filling pipes.

(*c*) A simple hard disc or guard placed approximately 8 inches from the nozzle end and, where the hose ends are subject to dragging, on the hydrant end also.

(2) The hose is not left on the ground, when not in use, unless the ends are protected in a suitable housing, or

(3) The hose is drained and hung in special lockers or wound on reels provided for that purpose when not in use.

(4) In moving the hose from place to place the ends of the hose are not allowed to drag.

(5) Water hose conforms to the specifications of the Association of American Railroads, or the equivalent, and the hydrant end of the hose is provided with a type of coupling permitting quick attachment and removal of the hose by a simple motion and this connection is protected by a rigid disc approximately 6″ in diameter and fitted 8″ from the hydrant end of hose.

Before attaching hose, the hydrant should be flushed briefly. Immediately after connecting the hose and before using any water from the hose it should be thoroughly flushed. It should be used for no other purpose.

It is recognized that the usual type of hose nozzle in use, which consists of a metal pipe or hose guarded by a 6″ metal disc, is not ideally suited for use in all instances and for this reason the employees should exercise extreme care in keeping the nozzle end of the hose

out of danger from pollution by its being thrown under the cars or pulled along the ground. The type of hose nozzle which will permit filling the water systems through the tapered nipple, in use on many railroad cars, and which can also be used in filling pressure water tanks has advantages. The operator should in all cases flush the end of the nozzle thoroughly before using the hose to fill either the overhead tanks or the pressure water tanks.

ITEM 3. WATER BUCKETS

Buckets used for the delivery of water from hydrants to conveyances shall be of satisfactory material and construction, shall be properly handled, and used only for this purpose.

Public health reason.—A clean bucket is necessary to deliver safe water. Proper construction, maintenance, and handling are important in preventing contamination and, therefore, in protecting the public health. Buckets will not be properly cleaned unless they are constructed so as to make cleaning easy and unless they are kept in good repair.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Buckets which are used for delivering water for drinking and culinary purposes from water hydrants or faucets to the water tanks or coolers of conveyances have tight-fitting complete covers which are kept closed when not in use, and are not used for any other purpose.

(2) Buckets are of adequate capacity and substantially constructed of metal and each bucket has a spout of sufficient size extending from the side of the bucket to permit rapid emptying.

(3) Buckets are kept clean and the exterior only is painted white and labeled "*For Drinking Water Only,*" are thoroughly flushed each time before using, and when not being used are stored in cabinets or cupboards used solely for this purpose.

The cabinets should be painted white on the inside, provided with secure locks, and kept clean and free of dust. For convenience, water buckets may be kept on ice carts, provided the storage compartment complies with these specifications and is entirely separated from the ice. Whenever the buckets are filled, their contents should be immediately supplied to the conveyance water tanks or coolers and they should not be kept in unprotected locations where they may be exposed to contamination for appreciable periods of time.

ITEM 4. HANDLING OF ICE

The methods of production, storage, delivery, and use of ice for the cooling of drinking water and for food preservation purposes in connection with the operation of land and air conveyances shall be carried out in a sanitary manner.

Public health reason.—Contaminated ice may cause disease, particularly if used in contact with the drinking water. Where ice and water are not normally in direct contact, there is still a considerable hazard if the ice is contaminated, principally through improper or careless handling, leaks in the cooler compartments, improper construction of coolers, or improper use of ice by passengers.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Ice is produced, stored, and handled at all times in a manner to assure freedom from contamination and the ice storage plant is provided with a suitable self-draining platform, drinking water hydrant, and hose for washing the ice. The following equipment, painted white, is desirable for handling the ice when considerable quantities are used: a cart of such construction as to permit ready cleaning, a pail of metal or other hard material with handle and reinforced bottom to be kept in a special locker, and an ice pick.

(2) Care is taken in the bulk storage of ice to see that floor drains are kept open at all times, that there is free drainage to the outlets, and that doors leading to storage rooms for ice are kept closed.

(3) Ice used from bulk storage for icing coolers is withdrawn in ample time to be washed thoroughly before being placed in the ice carts provided for the purpose, and open platforms, with slatted bottoms, are provided for cracking and chipping ice.

(4) Lids on the ice carts are kept closed until ice is removed and ice carts are built so as to drain and with space sufficient to house the bucket used in carrying ice into the cars.

(5) Ice carts and buckets are painted white on the outside, stencilled with the word "Ice" and used only for handling ice.

(6) If natural ice is used, approval of the source of supply by the State health agency concerned is obtained so that ice derived from polluted sources will not be used. In the use of manufactured ice, care is taken to obtain it from a reliable producer who can give satisfactory assurance that sanitary methods are employed in its manufacture.

(7) Ice is not used for the precooling of drinking water in constant temperature bottles or in other containers in which the water and ice are in contact, except when ice cubes are placed in individual glasses where food or drink is served.

(8) Other suitable means of precooling water, such as obtaining it from an electrically operated water cooler, are employed in instances where precooling is used.

Section III. Sanitary Facilities at Terminals and Yards

Places where land and air conveyances are serviced, such as depots, coachyards, terminals, bus stations, and airplane landing fields, shall

be provided with all sanitary facilities essential to the protection of public health.

ITEM 1. GENERAL

Equipment and facilities of adequate nature and extent shall be provided so that water, ice, foods, and the cleaning of conveyances shall be handled or carried out under acceptable conditions.

Public health reason.—Good housekeeping is essential to health. Proper equipment, facilities, and cleanliness at carrier terminals, stations, and coachyards tend to eliminate such diseases as may be borne by water, food, milk, ice, flies, insects, and rodents.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

Places where drinking water and foods are handled contain all necessary equipment for:

(*a*) Cleaning the conveyances.

(*b*) Removing the wastes.

(*c*) Furnishing water, ice, food, and other supplies as needed, and for providing essential servicing facilities. These facilities should be so arranged as to expedite the performance of the carrier's operations in an economic, safe, and sanitary manner.

Desirable sanitary facilities of a railway coachyard are: Suitable platforms with gutters and water lines; adequate drainage provisions; hydrants; hose, buckets, and storage facilities for them; ice house or car, ice carts, pails, and storage facilities; sewer connections, soil cans, and storage facilities; garbage cans with cleaning and storage shed, waste car and loading platform and incinerator where necessary; commissary with loading platform; service equipment for employees, including lockers, toilets, washrooms, drinking fountains, and lunchrooms. The coachyard should be kept clean, free of water puddles, fecal matter, and rubbish.

In the instance of other types of conveyances, such as motor busses and airplanes, similar sanitary facilities should be vided, subject to such limitations as the extent and nature of the traffic may indicate.

ITEM 2. WASTES DISPOSAL

Satisfactory facilities for the disposal of garbage, refuse, and trash shall be provided.

Public health reason.—Collections of garbage, refuse, and trash may furnish food stuffs for rats and other vermin and may serve as places of harborage therefor. In addition these wastes may accumulate to such an extent as to become a nuisance.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Garbage is stored in covered rat-proof metal cans and disposed of daily by city collection or incineration.

(2) Such covered garbage cans, when filled and prior to collection, are stored in a separate, all enclosed room or building provided with a concrete floor, suitable can-washing and drainage facilities, and loading platform.

(3) All combustible waste matter is incinerated or otherwise disposed of without creation of a nuisance or public health hazard.

(4) Other refuse is removed as quickly as possible to a sanitary dump ground or fill and a suitable loading platform is provided for handling such refuse where necessary.

(5) Terminals, coach yards, and servicing areas are kept free from rubbish by daily policing.

ITEM 3. IMPURE WATER SUPPLIES

Water of unsafe, doubtful, or unknown sanitary quality shall not be permitted for drinking or culinary purposes in any coach yard, station, bus terminal, airplane field, hangar, or room where land or air conveyances are serviced or maintained.

Public health reason.—The water supply should be of safe sanitary quality in order to be suitable for drinking and to avoid the contamination of food and utensils.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

Water of safe sanitary quality is provided in coachyards, stations, bus terminals, or airplane fields and hangars, etc.

However, where an existing impure water supply is used for cleaning, boiler feed, or fire purposes there must be no physical connection with the drinking water system and the outlets from the polluted supply shall be so located that there will be little danger of its accidental use for domestic purposes. The outlets shall be differentiated distinctly from drinking water hydrants, provided with fittings unsuited for drinking water hose connections, and posted with permanent signs warning that the water is "Unfit to Drink." Under no circumstances shall the impure supply have outlets or connections adjacent to drinking water hydrants.

ITEM 4. PLATFORMS AT SERVICING AREAS

Places or areas where land or air conveyances are serviced or handled, including the furnishing of water and food supplies, should

have satisfactory and adequately drained platforms or ground surfaces of impervious or hard packed materials kept in good repair and in a clean condition.

Public health reason.—Properly constructed platforms which are in good repair can be easily cleaned and kept in that condition. Platforms having an impervious surface can be cleaned more easily than those constructed of wood or other pervious or easily disintegrated material. Clean platforms are conducive to good health and sanitation.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Platforms are available to all tracks of permanent railway coachyards, at bus garages and terminals, at airplane fields and hangars, and similar places, and preferably are constructed of concrete or other impervious or hard surfaced materials and maintained in a clean condition.

(2) Drainage facilities are adequate to carry off all wash and surface waters.

(3) Suitable protection against rodents is provided.

ITEM 5. EXCRETA DISPOSAL AT TERMINALS AND YARDS

In places or areas where land and air conveyances are serviced, maintained, cleaned, or occupied by passengers at a terminal or yard, operations shall be so conducted as to avoid fecal contamination of these areas.

It is believed that the ultimate solution of this problem will be the discharge of all fecal wastes from the conveyance to a tank or tanks under the body of the conveyance and disposal of these wastes from such tanks to sewer system inlets in a sanitary manner. While there are many difficulties and technical problems involved in the development of such procedures, the carriers and other agencies concerned should endeavor to work for this goal by experimental installations and an engineering study of the problem.

Until developments along this line of study provide practical methods of handling conveyance wastes, acceptable practices will be: (1) the use of water-tight flexible connections between toilet hoppers and sewers, (2) use of paved parking areas with adequate drains to sewers together with flushing of the wastes in the areas to these drains prior to watering the coaches, (3) adequate policing to prevent use of toilets when the land conveyance is in the terminal or yard together with the use of soil cans set in toilet hoppers or attached to toilet hopper outlets during cleaning or flushing operations. Adequate equipment for the cleaning of soil cans and the disposal of their contents in a sanitary manner shall be provided. The water system

must be protected against contamination during the soil can cleaning operation.

Public health reason.—Proper excreta disposal has long been recognized as an essential public health measure. It is necessary that wastes be disposed of in a sanitary manner and that all excreta disposal facilities and equipment be kept separate from all other equipment and facilities. Excreta, improperly disposed of, constitutes a nuisance and a public health menace. Insertion of water pipe or hose in the soil can may, by reason of back siphonage, result in fecal matter or polluted water being drawn into the water supply system.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Flexible connections between toilet hopper discharge lines and sewer inlets are water-tight connections.

(2) Soil cans are of an open top design to fit car hopper outlets closely, made of durable, water-tight, rust-resisting material, designed so that they can be easily inspected and cleaned, and have sufficient capacity.

(3) The contents of the soil cans are disposed of preferably through special manholes connecting with sewers and the contents of soil cans are not dumped on the ground or left exposed or accessible to flies or insects.

(4) Soil cans are not cleaned at hydrants used for drinking water supplies.

(5) Suitable apparatus for cleaning soil cans after each usage is provided at places where cars are occupied, serviced, maintained or cleaned, kept separate from other cleaning apparatus, used only for this purpose and distinctly labeled so as not to be used for other purposes.

(6) The cans are cleaned by flushing for at least three minutes, and until no dirt is visible, with water at a nozzle pressure of at least twenty pounds per square inch and at the water main temperature. A steam connection should be provided to assist when necessary in removing contents adhering to the can. Cleaning shall be accomplished remote from water or food servicing operations, preferably at least 100 feet.

(7) A brush or cloth is not used because of the possibility of dispersing fecal matter.

(8) The cans are stored separate from other equipment in a special rack or locker when not in use, preferably as stated in last sentence in paragraph 6.

(9) Persons handling soil cans wash their hands thoroughly with soap and warm water before engaging in work connected with the handling of food, drinking water, or ice.

(10) The water supply line used for soil can cleaning is equipped with a back flow prevention device recommended or approved by the American Standards Association,[1] or when the discharge end of the line or hose is equipped with a guard of sufficient size and of such design as to prevent the insertion of the line or hose into the can.

(11) If paved parking areas are used, the entire area on which toilet wastes may be discharged or splashed is paved with concrete or equivalent impervious material.

(12) Drains connected to sewers are provided in the paved area at frequent intervals and the area sloped toward the drains so that the entire paved surface can be easily flushed to them.

(13) The paved areas are flushed clean of the discharges from the toilet hopper outlets promptly upon completion of coach cleaning and prior to watering of coaches in the area.

ITEM 6. WATER COOLER CLEANING EQUIPMENT

There shall be suitable facilities for the cleaning and flushing of the open-type removable water coolers in instances where equipment of this type is in use.

Public health reason.—Removable coolers and constant temperature bottles should be cleaned at regular intervals to avoid the accumulation of unsightly deposits. Constant temperature bottles should be subjected to effective bactericidal treatment after cleaning to eliminate any possibility of bacterial contamination.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Removable coolers, now in use in certain types of conveyances, are removed once each month for thorough cleaning and in the interim flushed thoroughly at the end of each round trip or seven-day period without removal from the conveyance.

When coolers are removed for thorough cleaning this should be done on a platform equipped with water and steam facilities, and protected against dust and other contamination borne by the wind. It may be necessary to use a suitable grease remover or washing powder in some cases. Records both of the flushing and of the cleaning should be kept near the cooler, showing dates of cleaning.

(2) In new equipment, a special sink is provided with hot and cold water taps, for washing and rinsing constant temperature bottles when used.

(3) After cleaning, constant temperature bottles are subjected effectively to one or more of the bactericidal processes described in

[1] See proposed American Standard "Back Flow Preventers in Plumbing Systems for Plumbing Fixtures and all Water Connected Devices." American Standards Association, 29 West 39th Street, New York, New York.

item 10 (5) of section 6 of the current edition of the Ordinance and Code Regulating Eating and Drinking Establishments recommended by the United States Public Health Service, summarized as follows:

(*a*) Immersion for at least 2 minutes in clean, hot water at a temperature of at least 170° F. or for one-half minute in boiling water. Unless *boiling* water is used, an approved thermometer shall be available convenient to the vat. The pouring of scalding water over washed bottles shall not be accepted as satisfactory compliance.

It is recommended that, whenever practicable, bactericidal treatment should be obtained through the use of hot water in the manner above described. For this method of bactericidal treatment two adjacent deep sinks should be provided and fitted with a porcelain, metal, or other impervious drainboard. After washing, the bottles should be placed in metal baskets and immersed in the hot water for the required period of time. Baskets may be lined with wooden strips to prevent damage. Upon removal from the hot water they should remain in the baskets until dry and then stored in such manner as not to become contaminated before again being used.

Where hot water is used for bactericidal treatment there shall be provided a hot water heater (preferably controlled by a thermostat) capable of maintaining a water temperature of at least 170° F. in the vat at all times when in use. The heating device may be integral with the immersion vat. Care shall be taken in the bactericidal treatment of bottles by immersion in hot water or chlorine rinse to prevent the trapping of air in the bottle, thus preventing contact with the entire surface of the container. This may be accomplished by placing the bottles in a venting position so that air will not be trapped.

(*b*) Immersion for at least 2 minutes in a lukewarm chlorine rinse containing at least 50 p. p. m. of available chlorine if hypochlorites are used, or a concentration of equal bactericidal strength if chloramines are used. The rinse should be made up at a strength of 100 p. p. m. or more of hypochlorites and shall not be used after its strength has been reduced below 50 p. p. m.

Solutions made from compounds containing chloramine or chloramine-T have a slower bactericidal action than hypochlorites containing equal concentrations of available chlorine. The former must therefore be made up to a sufficiently greater strength to produce a bactericidal effect within the required exposure period equivalent to that of the above hypochlorite concentration. The chloramine and chloramine-T concentration necessary will vary with the different compounds.

Chlorine solutions once used shall not be reused for bactericidal treatment on any succeeding day, but may be reused for other purposes. Where chlorine treatment is used, a three-compartment vat

shall be required, the first compartment to be used for washing, the second for plain rinsing, and the third for chlorine immersion, provided that for existing installations the second or rinsing compartment may be omitted if a satisfactory rinsing or spraying device is substituted. This will prevent the excessive consumption of chlorine by organic matter and washing compound carried over from the washing compartment. Upon removal from the chlorine rinse the bottles may be rinsed in clean running water, if desired, and allowed to dry either in the basket or inverted on a drain shelf or tray.

Frequent test should be made to determine that the chlorine rinse in actual use is of the required strength. The following test suitable for this purpose has been devised:

The test for chlorine strength makes use of the fact that when the proper amount of ortho-tolidine is added to a chlorine solution containing 20 p. p. m. or more, a precipitate is formed, except that in the case of certain chloramines the solution becomes cloudy at chlorine concentrations having a two-minute bactericidal strength equivalent to at least the bactericidal strength of 20 p. p. m. of available chlorine in the form of hypochlorite.

The testing outfit consists of two test tubes ⅜ by 4 inches, one of which contains ortho-tolidine. (For composition of ortho-tolidine solution see Standard Methods for the Examination of Water and Sewage published by the American Public Health Association.) The other is fitted with a medicine dropper and is used for testing the chlorine solution. It is etched at the 2 cc. and 5 cc. levels so as to make possible the dilution of the solution to be tested to two-fifths of its original strength, thus diluting an original solution of 50 p. p. m. or more to one of 20 p. p. m. or more, which, as above stated, is the critical point for the formation of the precipitate when hypochlorites are tested. Before any tests are made with the apparatus the medicine dropper should be tested to determine whether it delivers drops of the proper size. To do this, simply count the number of drops required to fill to the first mark of the testing tube. If the number required lies between 30 and 50 the dropper is satisfactory. If not, discard it and secure one of the proper size.

The test procedure is as follows: Rinse the testing tube and its dropper thoroughly with clean water. Fill the testing tube to the lower mark with the chlorine solution to be tested, using the dropper for this purpose. Avoid including floating particles. Fill to the second mark with clean water, using the dropper for this purpose.

Add one drop of ortho-tolidine. Hold the upper part of the testing tube firmly with one hand and tap the lower end of it sharply 50 times with one or two fingers of the other hand. If, in the case of hypochlorites, reddish or brownish particles separate out within 5 minutes,

the solution tested contains at least 50 p. p. m. of available chlorine. If, in the case of certain chloramines the solution becomes cloudy within 5 minutes, the solution tested has a bactericidal strength for a 2-minute exposure equivalent to at least the bactericidal strength of 50 p. p. m. of available chlorine in the form of hypochlorite.

In order to determine whether a certain commercial preparation is strong enough for kitchen use when mixed as directed on the label, mix a portion as directed, then dilute half and half, and test for 50 p. p. m. by means of the above-described test. If a precipitate appears, the directions upon the label result in a solution containing at least 100 p. p. m. in the form of hypochlorites or the bactericidal equivalent thereof and may be approved. Otherwise, such larger quantity of the stock solution should be used as will give a satisfactory test.

(*c*) Exposure in a steam cabinet, equipped with an indicating thermometer located in the coldest zone, to at least 170° F. for at least 15 minutes, or to at least 200° F. for at least 5 minutes. For a discussion of steam cabinets see item 14r of the U. S. Public Health Service Milk Code. Steam cabinets should be provided with a valve to permit the discharge of cold air when steam is admitted.

(*d*) Exposure in a properly designed oven or hot-air cabinet, equipped with an indicating thermometer located in the coldest zone, to hot air at a temperature of at least 180° F. for at least 20 minutes.[2]

Equipment that is too large to immerse may be treated (1) with live steam from a hose, in the case of equipment in which steam can be confined, (2) by boiling water rinse, or (3) by spraying or swabbing with chlorine solution of approved strength.

A thermometer should be used to check the actual temperatures used in the methods which employ heat as the bactericidal agent.[3]

If washing machines are used, the temperatures of both the wash water and the rinse water should be checked. For all bactericidal processes the actual period of exposure to the temperature or the chlorine rinse should be checked to determine compliance.

[2] See Studies of the bactericidal treatment of milk cans in hot-air cabinets. Pub Health Rep, 53 329-338 (1938) (Reprint No 1912).

[3] The following specifications for inspectors' milk temperature thermometers are designed to make this a general purpose thermometer suitable for determining not only refrigeration temperatures but also bactericidal treatment temperatures at dairies and restaurants

Inspectors' general purpose thermometers

Type.—Pocket type, mercury actuated
Magnification of mercury column.—To apparent width of not less than one-sixteenth inch
Scale range, 30° to 212° F. with extension either side permissible.
Temperature represented by smallest scale division, 2° F
Number of degrees per inch of scale.—Not more than 52.
Accuracy.—Within 2° F, plus or minus
Case.—Metal, provided with suspension ring and fountain pen clip.
Bulb.—Corning normal, or equally suitable thermometric glass.

Drying cloths, if used, shall be clean and shall be used for no other purpose. It is recommended that wherever possible utensils be permitted to drain dry without the use of drying cloths.

In washing machines the use of strong alkalis and higher wash water temperature makes it possible to employ a shorter exposure period for the final treatment. In such cases the above standards for bactericidal treatment will not apply, and other methods, such as the following, should be used for determining actual results obtained.

Where bacteriological laboratory facilities are available, the following proposed standard procedure for bacteriological examination of cleansed and disinfected utensils, provisionally established by the subcommittee on Standard Methods for the Examination of Dishwashing Devices of the American Public Health Association,[4] is recommended:

(*i*) By the multiple spoon test. Ten spoons are placed in a pint jar containing 200 cc. of sterile salt solution and agitated for 2 minutes.

(*ii*) By the multiple glass test. Ten glasses are examined by passing a damp swab three times around the inside rim and three times around the outside rim of each glass, and the swab is agitated between the swabbing of each successive glass in a test tube containing 10 cc. of sterile salt solution. Thus the test tube contains the pooled washings from 10 glasses.

(*iii*) By the multiple plate test. Ten plates are examined by passing a damp swab over a 4 square inch area of each plate and the swab is agitated between the swabbing of successive plates in 10 cc. of sterile salt solution.

(*iv*) The bacterial suspensions from the three foregoing types of utensils are each plated in the usual manner and the number of organisms per utensil is thereby determined.

(*v*) The bacterial count should not exceed 500 organisms per utensil surface area examined. (More recent work indicates that a standard of 100 is readily attainable, and this standard is therefore recommended.)

ITEM 7. FILTER CLEANING EQUIPMENT

There shall be available suitable equipment for the cleaning in a sanitary manner of water filters when used on land and air conveyances, as recommended by the manufacturer of the filter device.

Public health reason.—Water filters on conveyances provide a stopping place for any bacteria which may enter the system. Unless the filtering material is regularly cleaned and sterilized, it may serve as a focus of infection and liberate harmful bacteria into the drinking water supply. Filters are not necessary from the public health standpoint and their use is discouraged.

---

[4] American Public Health Association Year Book, 1936–1937, p. 48.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Filters, though not considered necessary from a public health standpoint, are cleaned, receive bactericidal treatment, and are stored and handled in a sanitary manner, or

(2) New sterilized units are installed.

ITEM 8. HANDLING OF FOOD AND DRINK SUPPLIES

Satisfactory facilities and equipment shall be provided at places or areas where land and air conveyances are furnished with food and drink supplies so that these supplies may be properly protected. Foods such as oysters, clams, and milk products shall not be repacked from one container to another.

Public health reason.—Unwholesome or spoiled food or drink may be harmful to the consumer. Food or drink not properly protected from contamination may become a public health hazard. For these reasons pure food and drink should be obtained and sanitary equipment and facilities for proper storing and disposing of the food and drink should be provided. The greatest danger of contamination lies in improper practices of handling food.

Satisfactory compliance.—This item shall be deemed to be satisfied when:

(1) The commissary building or space where land and air conveyances are serviced is located conveniently for servicing dining cars and other conveyances and receiving supplies from dealers. It shall be of rat-proof construction, providing suitable storage against contamination of food and other items used in dining cars or other conveyances, and shall embody the following sanitary features:

(*a*) Storerooms and supply rooms of smooth surface concrete or similar material.

(*b*) Suitable ventilation, lighting, heating, waste disposal, toilet, locker, and washing facilities. Toilet rooms should be provided with a permanent type of sign reading "Wash hands before starting work and after each visit to the toilet."

(*c*) Adequate bins, racks, and closets of metal or other durable and readily cleanable material.

(*d*) Thorough screening and rodent-proof construction.

(2) The commissary is maintained in a sanitary condition at all times, and the person in charge makes frequent inspections to see that all sanitary measures are complied with.

(3) All persons engaged in the handling or preparation of food in the commissary are free from communicable disease, as provided in section III, item 12 of this manual.

(4) The sources of food supplies are chosen on the basis of the purity of their products, and the food is handled in such a manner that it will not become contaminated.

(5) All multi-use utensils and all show and display cases or windows, counters, shelves, tables, refrigerating equipment, sinks, and other equipment or utensils used in connection with the operation of dining cars or rooms are so constructed as to be easily cleaned and are kept in good repair and cared for in such manner as to prevent contamination as far as practicable.

(6) Foods such as oysters, clams, and milk products are not repacked from one container to another.

ITEM 9. CLEANING OF CONVEYANCES

Suitable facilities shall be provided at the places or areas where land and air vehicles are cleaned so that such operations can be carried out without causing insanitary conditions or creating industrial or safety hazards detrimental to the health of employees.

Public health reason.—Frequent and regular cleaning of conveyances is necessary to avoid nuisances, to eliminate public health hazards, and for purely esthetic reasons. The public health would be endangered if filth were allowed to accumulate in the vehicles. Protection of the employees during the cleaning process, as from dusts, fumes, and gases, is necessary.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Equipment needed for the thorough cleaning of conveyances at regular intervals is provided and when vacuum or suction machines, compressed air devices, and other mechanical aids to cleaning operations are provided in places or areas where their use is desirable.

(2) Interior cleaning several times weekly is accomplished by sweeping and mopping the floor; dusting window shades, upholstery, and carpets; scrubbing and washing toilets, toilet room floors and wash basins; wiping down the woodwork of seats and window sills, and the glass of windows, doors, and lamps.

(3) More thorough cleaning at least once each week is accomplished by scrubbing the exposed floors with soap and water; similarly scrubbing the toilets and toilet room floors and wash basins; wiping down the woodwork, lamps, and metal work with moist or oiled cloths; thoroughly dusting window shades, upholstery, and carpets by beating and brushing, or by means of the vacuum process or compressed air; washing or otherwise cleaning windows; cleaning deck sash openings and ventilators; cleaning the bedding and curtains with compressed air or vacuum and thorough airing and laundering of sheets and pillow cases after each use.

ITEM 10. SANITARY FACILITIES FOR EMPLOYEES

There shall be adequate toilet, washroom, locker, and other essential facilities in or adjacent to places or areas where land and air conveyances are serviced, maintained, cleaned, or handled, for the use of the employees engaged in this work and these facilities shall be maintained in a sanitary condition.

Public health reason—If such facilities are not available for employees, public health will be endangered as the facilities of the conveyance will be used. This is apt to litter the station, terminal, or coachyard with filth and may result in the contamination of the water supply, food, or drink of the conveyance.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Toilets, wash rooms, lockers, and drinking fountains are provided; adequate toilet facilities are installed at convenient locations for use of employees; toilet rooms are supplied with toilet paper and there are available handwashing facilities in close proximity to the toilets; instructions are posted in the toilet rooms stating that the hands should be washed before resuming work; and employees do not use the toilets of conveyances when they are at a standstill at stations or at servicing areas or places except on conveyances having retention tanks.

(2) These toilet facilities comply with the existing State laws or regulations.

(3) Wash rooms, locker rooms, and lunch rooms comply with existing State laws or regulations on these subjects.

(4) Drinking fountains where provided are of design and construction in accordance with the American Standards Association's recommendations (Z 4.2—1942) as follows:

(*a*) The fountain should be constructed of impervious material, such as vitreous china, porcelain, enameled cast iron, other metals, or stoneware.

(*b*) The jet of the fountain should issue from a nozzle of non-oxidizing, impervious material set at an angle from the vertical such as to prevent the return of water in the jet to the orifice or orifices from whence the jet issues. The nozzle and every other opening in the water pipe or conductor leading to the nozzle should be above the edge of the bowl, so that such nozzle or opening will not be flooded in case a drain from the bowl of the fountain becomes clogged.

(*c*) The end of the nozzle should be protected by non-oxidizing guards to prevent the mouth and nose of persons using the fountain from coming into contact with the nozzle. Guards should be so designed that the possibility of transmission of infection by touching the guards is reduced to a minimum.

(4) The sources of food supplies are chosen on the basis of the purity of their products, and the food is handled in such a manner that it will not become contaminated.

(5) All multi-use utensils and all show and display cases or windows, counters, shelves, tables, refrigerating equipment, sinks, and other equipment or utensils used in connection with the operation of dining cars or rooms are so constructed as to be easily cleaned and are kept in good repair and cared for in such manner as to prevent contamination as far as practicable.

(6) Foods such as oysters, clams, and milk products are not repacked from one container to another.

ITEM 9. CLEANING OF CONVEYANCES

Suitable facilities shall be provided at the places or areas where land and air vehicles are cleaned so that such operations can be carried out without causing insanitary conditions or creating industrial or safety hazards detrimental to the health of employees.

Public health reason.—Frequent and regular cleaning of conveyances is necessary to avoid nuisances, to eliminate public health hazards, and for purely esthetic reasons. The public health would be endangered if filth were allowed to accumulate in the vehicles. Protection of the employees during the cleaning process, as from dusts, fumes, and gases, is necessary.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Equipment needed for the thorough cleaning of conveyances at regular intervals is provided and when vacuum or suction machines, compressed air devices, and other mechanical aids to cleaning operations are provided in places or areas where their use is desirable.

(2) Interior cleaning several times weekly is accomplished by sweeping and mopping the floor; dusting window shades, upholstery, and carpets; scrubbing and washing toilets, toilet room floors and wash basins; wiping down the woodwork of seats and window sills, and the glass of windows, doors, and lamps.

(3) More thorough cleaning at least once each week is accomplished by scrubbing the exposed floors with soap and water; similarly scrubbing the toilets and toilet room floors and wash basins; wiping down the woodwork, lamps, and metal work with moist or oiled cloths; thoroughly dusting window shades, upholstery, and carpets by beating and brushing, or by means of the vacuum process or compressed air; washing or otherwise cleaning windows; cleaning deck sash openings and ventilators; cleaning the bedding and curtains with compressed air or vacuum and thorough airing and laundering of sheets and pillow cases after each use.

ITEM 10. SANITARY FACILITIES FOR EMPLOYEES

There shall be adequate toilet, washroom, locker, and other essential facilities in or adjacent to places or areas where land and air conveyances are serviced, maintained, cleaned, or handled, for the use of the employees engaged in this work and these facilities shall be maintained in a sanitary condition.

Public health reason.—If such facilities are not available for employees, public health will be endangered as the facilities of the conveyance will be used. This is apt to litter the station, terminal, or coachyard with filth and may result in the contamination of the water supply, food, or drink of the conveyance.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Toilets, wash rooms, lockers, and drinking fountains are provided; adequate toilet facilities are installed at convenient locations for use of employees; toilet rooms are supplied with toilet paper and there are available handwashing facilities in close proximity to the toilets; instructions are posted in the toilet rooms stating that the hands should be washed before resuming work; and employees do not use the toilets of conveyances when they are at a standstill at stations or at servicing areas or places except on conveyances having retention tanks.

(2) These toilet facilities comply with the existing State laws or regulations.

(3) Wash rooms, locker rooms, and lunch rooms comply with existing State laws or regulations on these subjects.

(4) Drinking fountains where provided are of design and construction in accordance with the American Standards Association's recommendations (Z 4.2—1942) as follows:

(*a*) The fountain should be constructed of impervious material, such as vitreous china, porcelain, enameled cast iron, other metals, or stoneware.

(*b*) The jet of the fountain should issue from a nozzle of non-oxidizing, impervious material set at an angle from the vertical such as to prevent the return of water in the jet to the orifice or orifices from whence the jet issues. The nozzle and every other opening in the water pipe or conductor leading to the nozzle should be above the edge of the bowl, so that such nozzle or opening will not be flooded in case a drain from the bowl of the fountain becomes clogged.

(*c*) The end of the nozzle should be protected by non-oxidizing guards to prevent the mouth and nose of persons using the fountain from coming into contact with the nozzle. Guards should be so designed that the possibility of transmission of infection by touching the guards is reduced to a minimum.

(*d*) The inclined jet of water issuing from the nozzle should not touch the guard and thereby cause spattering.

(*e*) The bowl of the fountain should be so designed and proportioned as to be free from corners which would be difficult to clean or which would collect dirt.

(*f*) The bowl should be so proportioned as to prevent unnecessary splashing at a point where the jet falls into the bowl.

(*g*) The drain from the fountain should not have a direct physical connection with a waste pipe, unless the drain is trapped.

(*h*) The water supply pipe should be provided with an adjustable valve fitted with a loose key or an automatic valve permitting the regulation of the rate of flow of water to the fountain so that the valve manipulated by the users of the fountain will merely turn the water on or off.

(*i*) The height of the fountain at the drinking level should be such as to be most convenient to persons utilizing the fountain. The provision of several step-like elevations to the floor at fountains will permit children of various ages to utilize the fountain.

(*j*) The waste opening and pipe should be of sufficient size to carry off the water promptly. The opening should be provided with a strainer.

ITEM 11. CLEANLINESS OF EMPLOYEES

Persons engaged in the servicing of land and air conveyances with water, foods, or drinks shall wear clean outer garments or uniforms, overalls, aprons, etc., of washable material, which shall be laundered at frequent intervals and shall clean their hands by washing with soap and hot water after using a toilet or urinal and directly before beginning their duties and at all other times when necessary so that their hands may be clean and their duties may be performed in a sanitary manner.

Public health reason.—One of the greatest dangers in the contamination of water, food, or drink is in improper handling practices. Cleanliness of person, clothing, and facilities is essential to proper food handling. The same also applies to the practices of handling water. Contaminated food or drink is a public health menace.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

Proper facilities have been provided in the servicing area for the convenience of the employees and visual inspection shows that clean outer clothing or coverings of washable material are being worn and the hands of the employees are clean when engaged in handling drinking water, other beverages, foods, utensils, or equipment.

ITEM 12. FREEDOM OF EMPLOYEES FROM COMMUNICABLE DISEASE

No person shall work in any capacity in connection with the furnishing, handling, or serving of water or food supplies to land and air conveyances who is in the communicable stage of any of the diseases enumerated in the Interstate Quarantine Regulations of the United States. Any person found to be infected with any of the diseases enumerated in the Interstate Quarantine Regulations shall be separated immediately from connection with the duties of handling, preparing, or serving water, food, or drinks until free of such infection.

Quarantinable diseases [5]—For the purpose of interstate quarantine the following diseases shall be regarded as contagious and infectious diseases within the meaning of section 3 of the Act approved February 15, 1893: Plague, cholera, smallpox, typhus fever, yellow fever, typhoid fever, paratyphoid fever, dysentery, pulmonary tuberculosis, leprosy, scarlet fever, diphtheria, measles, whooping cough, epidemic cerebrospinal meningitis, anterior poliomyelitis, Rocky Mountain spotted or tick fever, syphilis, gonorrhea, chancroid, anthrax, influenza, pneumonia, epidemic encephalitis, septic sore throat, rubella, chickenpox, psittacosis, and trichinosis.

Public health reason.—Food or drink handlers infected with certain communicable diseases may readily transmit diseases and unknowingly contaminate food, drink, or utensils used by the public.

Satisfactory compliance.—This item shall be deemed to be satisfied when:

(1) Notice is sent to the local health officer by the supervisor or person having administrative direction of the work of employees, or by the employees engaged in the handling of water, food, or drinks, if he or any other employee contracts any infectious, contagious, or communicable disease, or has a fever, a skin eruption, a cough lasting more than three weeks, or any other suspicious symptom.

(2) Any person having such an illness or disease is excluded immediately from employment involving handling of water, food, or drinks until free of the infection.

Section IV. Sanitary Conditions of Conveyances

Sanitary conditions of all land and air conveyances, such as railway coaches, sleeping cars, dining cars, motor busses, and airplanes, shall be such as not to facilitate the interstate spread of any of the communicable diseases enumerated in the Interstate Quarantine Regulations of the United States and to this end such conveyances shall be maintained and operated in a satisfactory manner for the protection of health.

[5] From Interstate Quarantine Regulations of the United States as amended October 11, 1941.

ITEM 1. CONVEYANCE TOILET AND LAVATORY FACILITIES

When toilet and lavatory facilities are provided on conveyances they shall be kept clean.

Public health reason.—The maintenance of public toilet and lavatory facilities in a clean condition is most important for the prevention of the spread of disease.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Toilet hoppers are of such design as to prevent accumulation of fecal matter on the sides and so located as to eliminate spattering of other equipment, particularly of water filling pipes and station platforms.

(2) The design of the toilet discharge outlet pipe permits the attachment of a suitable soil can directly beneath it.

(3) A nonporous material is used for the floors of toilet and lavatory rooms, and toilets are supplied with toilet paper and lavatories with soap and individual towels; toilet and lavatory rooms are maintained in a clean and sanitary condition, cleaned effectively after each run or trip and locked after cleaning until the conveyance in which they are located is again put into service, except on conveyances having retention tanks.

(4) If cuspidors are furnished, they are of metal or other hard material with a smooth surface to facilitate cleaning and prevent accumulation of filth in chipped or broken surfaces.

The cuspidors shall be cleaned regularly. In cleaning at coachyards the apparatus and procedures used for cleaning soil cans may be used and the contents shall be disposed of in the same manner as soil can contents; when cleaned en route dumping of contents into car toilets and rinsing is usually sufficient. A tap for this purpose shall be provided where cuspidors are cleaned en route.

(5) Wash basins or lavatory facilities are fixed in place, of durable construction, and easily cleaned.

(6) In new equipment, the inlet to the basin is at least one inch above the overflow line of the basin so as to prevent back-siphonage.

(7) Wash basins have a smooth surface and are so designed as to have no rims, pockets, grooves, recessions, etc., in which scum, dirt, filth, grease deposits, or excess soap may collect or deposit.

ITEM 2. DISCHARGE OF WASTES FROM CONVEYANCES AT STATIONS

The discharge of fecal wastes, waste water, or other polluting materials while any land or air conveyance is at a station shall not be permitted unless proper devices such as soil cans, garbage receptacles, connections to a sewer line, etc., are used for the purposes for

which provided. Toilets shall be kept locked at all times when a conveyance is at a standstill in a depot unless adequate watertight containers are used to receive such fecal wastes and unless proper measures are taken for the sanitary disposal of such wastes and for the cleaning of the containers, as prescribed in section III of this manual.

Public health reason.—Disposal of excreta on the ground or in an improper manner at a station, terminal, or coachyard is a distinct public health menace as well as a nuisance condition.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Toilets are kept locked at all times when the conveyances are at a standstill, in a station, unless proper facilities and equipment have been provided as prescribed in section III of this manual and are used in a sanitary manner.

(2) Soil cans are placed beneath toilet hoppers of sleeping cars or set in toilet hoppers of other conveyances whenever such conveyances are open for passenger use at stations or at airports, unless toilets are locked to prevent their use, are connected with sewers or discharge to a properly paved area as provided in section III of this manual.

(3) Sleeping cars or other conveyances, parked for habitation in connection with conventions or public gatherings, are provided with water and sewer connections or other facilities necessary to maintain the area in a sanitary condition at all times.

(4) Conveyance toilets are not used by employees when the cars are unoccupied in a coachyard or terminal.

ITEM 8. DISCHARGE OF WASTES FROM CONVEYANCES EN ROUTE

There shall be no discharge from any land or air conveyance of fecal wastes, garbage, waste water, or other polluting materials while any such conveyance is passing through or over (1) any city or town, (2) a public water supply watershed, (3) the vicinity of a water supply intake in a lake or river, (4) a reservoir from which water for domestic use is derived, or (5) an approved area from which shellfish for domestic consumption are obtained.

The Public Health Service, in cooperation with the State health department having jurisdiction, shall designate and delimit the areas of watersheds and about water intakes and shellfish producing areas in which this requirement shall be complied with and shall notify the proper persons, firms, companies, or corporations of such areas. Under all conditions garbage shall be held in covered metal containers

until such material can be disposed of in accordance with section III, item 2 of this manual.

Public health reason.—Water supplies for domestic use or areas from which shellfish are obtained may readily become contaminated by excreta discharged from moving conveyances. Excreta discharged within cities or towns also create a nuisance and a definite public health menace.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

Toilet rooms are locked when passing through or over designated areas unless conveyances are provided with retention containers. It shall be the duty of the proper official of the carrier company to enforce compliance with this requirement by employees upon receipt of letters of notification from the State health officer designated and delimiting specific areas from time to time.

ITEM 4. CLEANLINESS OF CONVEYANCES

Land and air conveyances when in transit or operation shall be kept clean and sanitary, free of dirt, odors, rodents, flies, and other insects.

Public health reason.—Frequent cleaning of conveyances is necessary to avoid nuisances and to eliminate public health hazards. The public health would be menaced if filth were allowed to accumulate in the conveyance.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Cleaning of conveyances while occupied is limited to the minimum consistent with the maintenance of clean conditions and is carried out so as to cause the least possible raising of dust or other annoyance to passengers, and cleaning by dry sweeping or dry dusting is avoided while the conveyance is occupied by passengers.

(2) Offensive odors in toilets or other parts of the conveyance, not removed by cleaning these places, are eliminated by treatment with some odor-destroying substance, and the use of deodorants is not resorted to as a substitute for proper cleaning or disinfecting.

(3) A conveyance which has been infested with bedbugs, lice, or flies is treated effectively to destroy the insects and not put into service until such treatment has been given.

(4) Flies, mosquitoes, insects, and rodents are exterminated by proper methods without delay when found on land and air conveyances. In screened or air-conditioned conveyances it shall be the duty of the employees while in transit to keep them free of flies, mosquitoes, and other insects.

(5) Roller towels or other towels for common use by more than one person are not permitted; roller towels of the so-called "pull-clean" type are not permitted and provision of combs and brushes for common use is not allowed.

(6) Spitting or blowing the nose or brushing the teeth over wash basins in conveyances is prohibited. Separate basins for brushing the teeth shall be provided in the washrooms of sleeping cars or other conveyances having sleeping accommodations.

(7) Soap dispensers supplying either liquid or powdered soap for individual use are provided in wash rooms. Individual bars of soap may be provided in lieu of soap dispensers.

ITEM 5. VENTILATION AND HEATING OF CONVEYANCES

All land and air conveyances shall be so ventilated as to insure an adequate supply of fresh or conditioned air at all times while in service and so heated in cold weather as to maintain comfort.

Public health reason.—Constant circulation of fresh or conditioned air as well as temperature control is desirable for the comfort of the occupants of the conveyances.[6]

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

All conveyances while in service are provided with an adequate supply of fresh or conditioned air and in cold weather are heated so as to maintain a comfortable temperature.

Section V. Water Supply Facilities of Conveyances

Equipment on conveyances for the storage and distribution of water used for drinking and culinary purposes shall be satisfactory.

ITEM 1. WATER SYSTEM OF CONVEYANCE

The water system, either of the pressure or gravity type, on any land and air conveyance preferably shall be complete and closed from the filling ends to the discharge taps. Water of like quality shall be supplied for all purposes: drinking, culinary, washing, and toilet-flushing. The storage tanks shall be flushed periodically with potable water.

Desirable features of a water system are: adequate capacity for maximum requirements, use of durable metal, and construction such as to facilitate cleaning and inspection.

---

[6] Report of the Committee on the Medical Aspects of Air Conditioning of Cars. Association of American Railroads, May 19, 1939.

A Study of Surface Temperatures in Sleeping Cars, by T. R. Crowder, M. D. Transaction of the 21st Annual Meeting of the Medical and Surgical Section of the Association of American Railroads, May 27 and 28, 1941.

Instructions to Car Service Employees on Heating of Air-Conditioned Cars. The Pullman Company, February 1940.

Public health reason.—If the water system of the conveyance is not a closed system and properly constructed, contamination of the supply, with resulting danger to the public health, may occur. Flushing of tanks will remove sediment which may accumulate.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) All units are connected so that the same water is supplied from the filling pipes to the discharge taps for all purposes.

(2) All storage tanks are flushed at least once each month and in some cases more frequently, depending upon the condition of the water. Such cleaning can be accomplished effectively and readily by flushing with potable water.

(3) Tanks which are located under the roof of the conveyances are designed so they can be flushed from the overhead intakes, and pressure tanks underslung on the conveyance are provided with drain taps so that they can be readily flushed. In all cases where conveyances have been standing for some time and are about to be put into service this flushing shall be thoroughly done. In cases where water used in the water system has been contaminated this flushing shall be preceded by disinfection.

In cases of known pollution of a water system such as might occur by filling the tank with polluted water the following procedure is suggested for disinfecting the system: Make a paste by adding a little water gradually to one pound of chloride of lime or other chlorine disinfecting compound containing approximately 25 percent available chlorine. (If chlorine content of compound used is higher or lower than 25 percent, change the quantity used accordingly.)

To this paste or mixture add 5 gallons of water, stir thoroughly, and allow to settle. This stock solution will provide a chlorine concentration of 50 to 60 p. p. m. if added to 500 gallons of water. The proper quantity of stock solution to provide 50 p. p. m. of chlorine should be poured into the tank with the water used in filling, all fixtures opened briefly to fill the lines with chlorinated water and then allowed to stand for fifteen minutes or longer. The system should then be completely drained and flushed with water from an approved source.

ITEM 2. WATER FILLING CONNECTIONS OF RAILWAY CONVEYANCES

In new equipment there shall be filling pipes or connections for supplying the water tanks on both sides of the conveyance so that the sanitary quality of the water may not be impaired by inadequate equipment or facilities.

Public health reason.—Standard filling connections, easily cleanable and conveniently located and protected, decrease the hazard of contamination of the water supply during filling.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) A single type of filling pipe or connection is available for all gravity water systems and one type for all pressure water systems, and these are as nearly alike as possible so that a direct and tight joint can be made with the same type of waterhose nozzle.

The essentials of a satisfactory filling pipe connection are: hard smooth material; sturdy and simple construction to permit a tight joint and ready cleaning; and suitable protection against contamination, including proper location with respect to toilet hoppers.

(2) The end of the filling pipe is flushed with potable water before attaching the hose.

(3) The filling pipe connection has a tapered nipple extending from the side of the conveyance or underneath the conveyance and protected by a metal box or shield.

This box or shield is provided to prevent contamination by waste discharges from the conveyance and the operator should thoroughly flush this box and nipple before making the hose connection. Such a tapered nipple connection on each side of the conveyance makes it unnecessary to throw or drag the hose from one side of the conveyance to the other.

ITEM 3. CONVEYANCE WATER COOLERS

Coolers for water shall be maintained in a sanitary condition at all times and shall be so designed and constructed that the water cooled for drinking purposes shall be chilled in such manner that the ice or refrigerant cannot come in contact with the water. A supply of single service cups shall be available at all water coolers or chilled water faucets on land and air conveyances unless coolers are equipped with bubblers.

Public health reason.—If water coolers or containers are not constructed so that they can be easily cleaned and are not kept in good repair, it is unlikely that they will be properly cleaned. If ice is allowed to come in contact with the drinking water, contamination of the water may result from impurities in the ice or those placed in it when it is handled.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Water coolers are an integral part of a closed water system with water compartment consisting of enlarged pipe, coil, pan or tank, and with connections only to storage tank, faucet, and drain.

(2) The open-type removable cooler has the following features: separate ice and water compartments; durable rust-resisting metal construction; interior design permitting ready inspection; ice compartment with reinforced bottom; opening in front of cooler for the

insertion of ice; water compartment opening in top of cooler only large enough to admit filling end of hose or of bucket spout and provided with self-closing lid; water and ice compartments with separate drains; ice compartment drain located so that procurement of drain water by user is not possible.

(3) Removable coolers are thoroughly cleaned periodically while in use, by flushing for two minutes with potable water under adequate pressure, using suitable equipment provided for this purpose, as prescribed in section III, item 6 (1) of this manual.

(4) Records showing date and place of cleaning are kept, preferably on the cooler or in the cooler compartment.

(5) In conjunction with coolers, individual paper cups are available to the passengers.

ITEM 4. WATER FILTERS ON CONVEYANCE

Such appliances are considered unnecessary. However, where such devices are employed they must not introduce any pollution hazard to the drinking water supply.

Public health reason.—Most water supplies used on land and air conveyances are practically free from turbidity or are treated at or near the source to remove such turbidity before the supply reaches the conveyance. In most instances, since the water is considered safe and free enough from suspended matter to be used without further treatment by the public, water filters on the conveyances are unnecessary. In fact, such filters frequently increase the chance of contamination of the water due to improper sterilization or handling of the filtering material before it is placed in service. Filters therefore frequently produce a hazard rather than eliminate a danger to the public health.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) No filters are used, or

(2) If used, they are handled in accordance with provisions of section III, item 7 of this manual.

ITEM 5. DISPENSING OF DRINKING WATER ON CONVEYANCES

There shall not be provided for drinking water purposes any cup, glass, or any other container which may be used by more than one person unless such cup, glass, or container shall have been thoroughly cleansed and subjected to bactericidal treatment after each individual use, in the manner prescribed for utensils used in the preparation and serving of foods, as set forth in item 10 (5) of section 6 of the current edition of the Ordinance and Code Regulating Eating and Drinking

Establishments recommended by the United States Public Health Service, which is summarized in section III, item 6 (3) of this manual.

Public health reason.—Certain communicable diseases may be transmitted from person to person by means of the so-called "common drinking cup" unless such cup is treated after each use to kill all harmful bacteria. Individual, one-service drinking cups eliminate this health hazard.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

Single service cups are provided at all water coolers on land and air conveyances unless (1) drinking fountains are provided, or (2) facilities are available, for immediate use on the conveyance, to clean thoroughly the glasses, cups, etc., and subject them to the prescribed bactericidal treatment as required for glassware, utensils, and equipment used in dining cars having facilities for work of this kind.

ITEM 6. USE OF CONSTANT TEMPERATURE BOTTLES FOR WATER

Bottles or containers of a constant temperature type which are used on land and air conveyances for the storage and dispensing of drinking and culinary water or foods shall be maintained in a sanitary condition at all times. Ice for cooling shall not be placed in contact with water in such bottles or containers either on the conveyance or when they are filled preparatory to being placed on the conveyance.

Public health reason.—Clean bottles or containers for water or other beverages are necessary to deliver a safe product. Ice may be contaminated upon freezing or may become contaminated by handling and therefore should not be permitted to come in contact with the drink or food in the bottles or containers.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) Equipment of this kind is filled by using proper facilities as prescribed in section II of this manual, and, in cases where the water is precooled before use, it is done in the manner prescribed under item 4 of section II, and such equipment is cleaned in the manner prescribed under item 6, section III, of this manual.

(2) Constant temperature bottles or containers used for supplying drinking and culinary water are not used for other liquids, beverages, or food products but for the exclusive purpose of holding drinking and culinary water unless cleaned and sterilized before use, and when such bottles or containers are not filled in toilet rooms, wash rooms, or other places which expose them to contamination.

(3) The methods used in the cleaning of constant temperature bottles and containers comply with one or more of the procedures for bactericidal processes described in item 10 (5) of section 6 of the

current edition of the Ordinance and Code Regulating Eating and Drinking Establishments recommended by the United States Public Health Service, summarized in section III, item 6 of this manual.

Section VI. Conveyance Dining Space Facilities

The equipment, facilities, and conditions on land and air conveyances relating to the storage, preparation, handling, and serving of food and drink shall be such as to assure protection to the health of the consumers of food and drink.

* * * * *

ITEM 1. GENERAL

All dining cars, dining rooms or compartments, kitchens, pantries, lockers, or other spaces on conveyances, or such facilities used to serve air conveyances where food or drink is stored, prepared, handled, or served shall be maintained at all times in an acceptable sanitary manner so as to comply with the requirements prescribed for Grade A restaurants in the current edition of the Ordinance and Code Regulating Eating and Drinking Establishments recommended by the United States Public Health Service which are summarized as follows insofar as they apply to the operating conditions of land and air conveyances.

(*a*) Floors. The floors of all rooms in which food or drink is stored, prepared, or served, or in which utensils are washed, shall be of such construction as to be easily cleaned, shall be smooth, and shall be kept clean and in good repair.

(*b*) Walls and ceilings. Walls and ceilings of all rooms shall be kept clean and in good repair. All walls and ceilings of rooms in which food or drink is stored or prepared shall be finished in light color. The walls of all rooms in which food or drink is prepared or utensils are washed shall have a smooth, washable surface up to the level reached by splash or spray.

(*c*) Doors and windows. When flies are prevalent, all openings into the outer air shall be effectively screened and doors shall be self-closing, unless other effective means are provided to prevent the entrance of flies.

(*d*) Lighting. All rooms in which food or drink is stored or prepared or in which utensils are washed shall be well lighted.

(*e*) Ventilation. All rooms in which food or drink is stored, prepared or served, or in which utensils are washed, shall be well ventilated.

(*f*) Water supply. The water supply shall be easily accessible to all rooms in which food is prepared or utensils are washed, and shall be adequate, and of a safe sanitary quality.

(*g*) Lavatory facilities. Adequate and convenient hand-washing facilities shall be provided, including warm water, soap, and approved sanitary towels. The use of a common towel is prohibited. No employee shall resume work after using the toilet room without first washing his hands.

(*h*) Construction of utensils and equipment. All multi-use utensils and all show and display cases or windows, counters, shelves, tables, refrigerating equipment, sinks, and other equipment or utensils used in connection with the operation of dining space shall be so constructed as to be easily cleaned and shall be kept in good repair.

(*i*) Cleaning and bactericidal treatment of utensils and equipment. All equipment, including display cases or windows, counters, shelves, tables, refrigerators, stoves, hoods, and sinks, shall be kept clean and free from dust, dirt, insects, and other contaminating material. All cloths used by waiters, chefs, and other employees shall be clean. Single-service containers shall be used only once.

All multi-use eating and drinking utensils shall be thoroughly cleaned and should be effectively subjected to an approved bactericidal process after each usage. In all new installations necessary equipment shall be provided permitting application of bactericidal procedures. All multi-use utensils used in the preparation or serving of food and drink shall be similarly treated immediately following the day's operation. Drying cloths, if used, shall be clean and shall be used for no other purpose.

(*j*) Storage and handling of utensils and equipment. After bactericidal treatment no utensil shall be stored except in a clean dry place protected from flies, dust, or other contamination, and no utensil shall be handled except in such a manner as to prevent contamination as far as practicable. Single-service utensils shall be purchased only in sanitary containers, shall be stored therein in a clean dry place until used, and shall be handled in a sanitary manner.

(*k*) Disposal of wastes. All wastes shall be properly disposed of, and all garbage and trash shall be kept in suitable receptacles in such manner as not to become a nuisance.

(*l*) Refrigeration. All readily perishable food or drink shall be kept at or below 50° F. except when being prepared or served. Proper disposal shall be made of waste water from refrigeration equipment.

(*m*) Wholesomeness of food and drink. All food and drink shall be wholesome and free from spoilage. All milk, fluid milk products, ice cream, and other frozen desserts shall be from sources approved by the State or local health officer having jurisdiction, subject to such additional requirements as may be specified in the Interstate Quarantine Regulations of the United States or elsewhere in this manual.[7]

[7] For quality standards of milk and milk products, see section VI, item 2 (5) of this manual.

Milk and fluid milk products shall be served in the original containers in which they were received from the distributor or from a bulk container equipped with an approved dispensing device.[8] This requirement shall not apply to cream, which may be served from the original bottle or from a dispenser approved for such service. All oysters, clams, and mussels shall be obtained from dealers whose names appear on the current list of shellfish shippers whose State certificates are published by the Public Health Service.

(*n*) Storage and display of food and drink. All food and drink shall be stored and displayed so as to be protected from dust, flies, vermin, unnecessary handling, droplet infection, overhead leakage, and other contamination. No animals or fowls shall be kept or allowed in any room in which food or drink is prepared or stored. All means necessary for the elimination of flies shall be used.

(*o*) Cleanliness of employees. All employees shall wear clean outer garments and shall keep their hands clean at all times while engaged in handling food, drink, utensils, or equipment.

(*p*) Miscellaneous. The premises of all restaurants shall be kept clean and free of litter or rubbish. None of the operations connected with the conveyance dining space shall be conducted in any room used as living or sleeping quarters. Adequate lockers or dressing rooms shall be provided for employees' clothing and shall be kept clean. Soiled linens, coats, and aprons shall be kept in containers provided for this purpose.

Public health reason.—Food or drink not properly protected from contamination may become a public health hazard.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) The current edition of the Ordinance and Code Regulating Eating and Drinking Establishments recommended by the United States Public Health Service for adoption by States, municipalities, counties, or health districts is applied to land and air conveyances, subject to such changes or amendments as may be indicated by necessary differences in operating practices in a restaurant not having a fixed location, but instead in daily transit or movement as is the case in the instance of land and air conveyances.

(2) Dining cars or rooms of conveyances are maintained in a sanitary condition at all times when in operation; are so constructed as to permit ready and thorough cleaning, especially of the pantry and kitchen; are provided with suitable storage for the preservation of food and other supplies and to prevent entrance of flies or other insects and rodents.

[8] For bulk milk dispenser requirements, see item 14 of the Ordinance and Code Regulating Eating and Drinking Establishments Recommended by the Public Health Service.

(3) Only food of approved quality is served; and all persons employed in the preparation or serving of food in a dining car are free from communicable diseases.

(4) Milk and milk product containers are thoroughly cleaned before they are returned to the milk distributor.

(5) The person in charge inspects the dining and kitchen space each day to insure maintenance of thorough cleanliness in all its parts.

ITEM 2. COMPLIANCE WITH INTERSTATE QUARANTINE REGULATIONS

The rooms, compartments, or spaces on land and air conveyances shall comply at all times with the specific requirements of the current issue of the Interstate Quarantine Regulations of the United States, prescribing certain requirements with respect to dining cars and dining rooms.

Public health reason.—Food or drink not properly stored, handled, or served may become contaminated and create a public health hazard.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

(1) All spaces where food is prepared or served are screened against the entrance of flies or other insects during the season of flight of such insects. It shall be the duty of employees to destroy flies or other insects which may gain entrance.

(2) A suitable lavatory, conveniently located, with soap and individual towels, is provided for the use of employees engaged in the preparation or serving of the foods, and such lavatory is kept in clean and sanitary condition at all times.

(3) Employees engaged in the preparation or serving of foods or drinks thoroughly cleanse their hands by washing with soap and hot water after using toilet or urinal and directly before beginning their duties.

(4) All crockery, dishes, glassware, and utensils used in the preparation or serving of foods or drinks are thoroughly washed until clean each time after use and, where facilities can be provided in existing equipment, are subjected to bactericidal treatment by immersing in clean hot water at a temperature of 170° F. or more for at least two minutes, or in boiling water for one-half minute. An approved dishwashing machine, properly operated, will be considered as meeting the above requirements. The pouring of scalding water over washed utensils shall not be accepted as satisfactory compliance. In all new installations necessary equipment shall be provided permitting application of bactericidal procedures. The methods and procedures for the cleaning and bactericidal treatment of utensils and equipment prescribed in item 10 of section 6 of the current edition of the Ordinance and Code Regulating Eating and Drinking Establishments

recommended by the United States Public Health Service will be regarded as equally acceptable as the above-described procedures, in the instance of specific interstate carrier companies where operations are of a limited character or when operating conditions will not permit the installation of heavy or bulky equipment for dishwashing, when approved by the Federal and State health agencies having jurisdiction.

(5) No spoiled or tainted food whether cooked or uncooked is served in a land or air conveyance and no milk or milk products are served unless the milk is Grade A pasteurized as defined in the latest edition of the Milk Ordinance and Code [9] recommended by the United States Public Health Service or is Grade A raw milk which has been boiled.

In lieu of Grade A pasteurized milk, certified milk-pasteurized may be served. Certified milk-pasteurized is defined as certified milk-raw which conforms with the current requirements of the American Association of Medical Milk Commissions and is produced under the supervision of a medical milk commission and of the State board of health, or of a city or county health officer, and which has been pasteurized, cooled, and bottled in a milk plant conforming with the requirements for Grade A pasteurized milk of the latest edition of the Milk Ordinance and Code recommended by the Public Health Service: *provided*, that where Grade A pasteurized milk or certified milk-pasteurized, as defined above, is not obtainable, a substitute grade of pasteurized milk may be served temporarily if permitted by the Public Health Service until such time as milk meeting the above requirements is obtained.

(6) Refrigerators, food boxes, or other receptacles in which food is stored are kept in a clean and sanitary condition at all times and are emptied and thoroughly washed with soap and hot water at least once in each seven days that they are in use and following the return to service of conveyances which have been out of active service.

(7) Garbage containers in sufficient number, with tight-fitting covers, are provided to care for all food refuse and other wastes, and such wastes are not thrown from the land or air conveyance.

(8) No person is working in any capacity in connection with the preparation or serving of food who is in the communicable stage of any of the diseases enumerated in the Interstate Quarantine Regulations of the United States and, when any person found to be infected with any of the diseases enumerated in the Interstate Quarantine Regulations (section III, item 12 of this manual) is separated immediately from connection with the duties of preparing or serving foods or drink until free of such infection. All persons employed for such service shall undergo a physical examination by a competent physician before

[9] Copies may be purchased from the Superintendent of Documents, Washington, D. C., for 35 cents.

being assigned to service and before returning to work after any disabling illness and at such other times during their service as may be necessary to determine their freedom from such diseases and shall be immediately relieved from service if found to be so afflicted.

(9) When the person in charge of the spaces set aside for the preparation or serving of food is responsible for compliance with all sanitary requirements and makes an inspection of such spaces each day for the purpose of maintaining cleanliness of all parts thereof.

ITEM 3. MISUSE OF DINING SPACE FACILITIES

Dining car space shall not be used for sleeping quarters.

Public health reason.—The use of dining space facilities for other than the preparation, handling, serving, and consumption of food and drink increases the likelihood of contamination of the food and drink.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

The space provided on the conveyance for the preparation and handling of food and drink is not used as sleeping quarters or for personal ablutionary purposes by employees or other persons.

Section VII. Sanitary Quality of Food and Drink

Foods and beverages provided on land and air conveyances shall be of such quality and stored or served under such conditions as not to become agents in the interstate spread of any communicable disease.

ITEM 1. WHOLESOMENESS OF FOOD AND DRINK

All food and drink shall be wholesome and free from spoilage. All milk, fluid milk products, ice cream and other frozen desserts served shall be from sources approved by the State or local health officer having jurisdiction, subject to such additional requirements as may be specified in the Interstate Quarantine Regulations of the United States or elsewhere in this manual.

Public health reason.—Protection of the public health requires that food and drink be obtained from safe sources and handled to minimize danger of contamination, particularly those foods eaten uncooked such as milk, ice cream, oysters, fresh fruits, and vegetables.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

The requirements of item 14, "Wholesomeness of food and drink," of section 6 of the current edition of the Ordinance and Code Regulating Eating and Drinking Establishments recommended by the Public Health Service are complied with. These requirements are summarized in section VI, item 1, paragraph (*m*) of this manual.

ITEM 2. STORAGE OF FOOD AND DRINK

All food and drink shall be so stored as to be protected from dust, flies, vermin, unnecessary handling, droplet infection, overhead leakage, and other contamination. No animals or fowls shall be kept or allowed in any room in which food or drink is prepared or stored. All means necessary for the elimination of flies shall be used.

Public health reason.—Food or drink not properly protected from contamination may become a public health hazard.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

The requirements of item 15, "Storage and display of food and drink," of section 6 of the current edition of the Ordinance and Code regulating Eating and Drinking Establishments recommended by the Public Health Service are complied with. These requirements are summarized as follows insofar as they apply to land and air conveyances:

(*a*) All food and drink are stored in such manner as to be protected from dust, flies, vermin, unnecessary handling, droplet infection, overhead leakage, sewage back flow, and other contamination. Evidence of the presence of rodents, roaches, ants, or other vermin shall be considered as violating this item. Serving of sliced butter and cracked ice shall not be by direct contact with fingers or hands. Bottled milk and other beverages in nonleakproof containers shall not be submerged in water for cooling. Food or drink shall not be stored on floors which are subject to flooding from sewage back flow.

(*b*) Dustless methods of floor cleaning are used, or dust-arresting sweeping compounds and push brooms are employed; and all except emergency floor cleaning is done during those periods when the least amount of food and drink is exposed, such as after closing or between meals.

(*c*) No animals or fowls are kept or allowed in any room in which food or drink is prepared or stored.

(*d*) All supplementary means necessary for the elimination of flies, such as fly-repellent fans, fly paper, fly traps, or fly-killing sprays or powders, are employed.

ITEM 3. REFRIGERATION OF FOOD AND DRINK

All readily perishable food or drink shall be kept at or below 50° F. except when being prepared or served. Proper disposal shall be made of waste water from refrigeration equipment.

Public health reason.—Usually the bacteria in food are harmless and if this were always true there would be no reason to refrigerate

food except to prevent spoilage. There is, however, no way to be sure that pathogenic bacteria have not entered the food (even though observance of the other items of this manual will reduce this likelihood). The likelihood of contracting disease may be increased when food contains large numbers of disease-producing organisms. For this reason perishable foods shall be kept cold so that any small number of disease-producing bacteria which may have entered will not multiply.

Satisfactory compliance.—This item shall be deemed to have been satisfied when:

The requirements of item 13, "Refrigeration," of section 6 of the current edition of the Ordinance and Code Regulating Eating and Drinking Establishments recommended by the Public Health Service are complied with. These requirements are summarized as follows insofar as they apply to land and air conveyances:

(*a*) All readily perishable foods or drinks, including milk and milk products, are kept at or below 50° F. except when being prepared, kept warm, or served. This shall include all cream-filled pastries.

(*b*) All ice used is from a source approved by the State or local health officer having jurisdiction and is stored and handled in such manner as to prevent contamination. Water used to wash ice shall comply with the construction, operation, and sanitation standards of the State board of health.

(*c*) All waste water from refrigeration equipment drains into an open sink or drain.

FELLOWSHIPS IN HEALTH EDUCATION

Convinced of the need for qualified health educators to carry on essential health education during this emergency and in the reconstruction period to follow, the W. K. Kellogg Foundation has made a grant of funds to the United States Public Health Service for the establishment of 20 fellowships leading to a master's degree in public health with a major in health education.

The experience of those organizations in which health education has been effective has demonstrated that the health educator must have a complete mastery of education and must also be professionally trained in community health education. In the past, scientific training of this nature has been limited. The present shortage of such highly trained personnel, as well as a contemplated demand growing out of future expansion of health education activities, both in this country and in foreign lands, is the chief concern of the sponsors of the fellowships. For this reason, the stipends of $100 per month plus tuition not only provide for a year's training (9 months of intra-mural

work and 3 months of supervised field experience) but also anticipate trainee employment following successful completion of the basic training. Arrangements have been completed for the training to be given at the University of North Carolina at Chapel Hill beginning March 20, 1943.

A candidate for the position of health educator should have not only sound scientific training but good personal health and a pleasing appearance. There is great need for the health educator to have creative ability, leadership qualities, sound judgment, common sense, and adaptability. Since the success of the person in this field depends upon these qualifications, the awarding of fellowships will be made accordingly.

In view of the fact that the field of community public health education is new, standardized and specific training as a qualification for the fellowships could not fairly be requested. However, it is considered pertinent and important if the candidate is able to present a background including some or all of the following areas of knowledge and skill:

1. Basic cultural education, including the development of appreciations and skills in the use of the English language.
2. Basic science education, including physics, chemistry, biology, physiology, and bacteriology.
3. Training in education and educational psychology.
4. Social science education to provide an appreciation of the importance of respect for human personality and government.

Anyone interested and qualified may obtain application blanks from the Surgeon General, U. S. Public Health Service, Washington, D. C. Final application forms must be postmarked not later than March 1, 1943.

MORTALITY SUMMARY FOR LARGE CITIES IN THE UNITED STATES, 1942

The number of deaths in 88 major cities in the United States in 1942 increased 1.4 percent as compared with that for 1941, the respective figures being 440,734 and 434,530, according to provisional reports recently issued by the Bureau of the Census. The provisional death rate for these cities for 1942 is 11.8 per 1,000 population, as compared with a final rate for 1941 of 11.7.

General mortality.—In general the weekly death rates for the first 8 months of the year followed closely those for the average of the 3-year period 1939–41, with the exception that the rates in January and February of 1942 showed a marked decline, whereas those for the

1939–41 average showed a very considerable increase in those months and were also definitely in excess of similar rates for the 3-year averages in the corresponding 1938–40 period. Rates for the last 4 months of 1942 were consistently higher, except for 1 week in September, than those for the 3-year average, with notable excesses for the weeks ended October 12, 1942, and January 3, 1943.

Infant mortality.—The number of infant deaths reported in these cities in 1942 was 30,526, and represents an increase of 10.7 percent over provisional figures for 1941, but the infant death rate per 1,000 live births in 1942 is 9.2 percent lower than in 1941, the provisional infant death rate in 1942 being 34.5 per 1,000 live births, while the final rate reported for 1941 is 38.0.

All mortality figures are tabulated on the basis of place of death, and not place of residence. The death rates are based on populations as enumerated in the 1940 census. On account of considerable movement in population since the census was taken, these rates may not be rigorously comparable with those for recent prior years, and especially the rates for individual cities should be interpreted with a certain degree of caution.

	Provisional		Final
	1942	1941	1941
Total deaths, 88 cities	[1] 440,734	[1] 434,530	[2] 437,096
Deaths per 1,000 population	[3] 11.8		[3] 11.7
Deaths under 1 year of age	[1] 30,526	[1] 27,581	[2] 28,787
Deaths under 1 year of age per 1,000 live births	[3] 34.5		[4] 38.0

[1] Based upon weekly telegraphic reports from city health officers.
[2] Tabulation of transcripts from State registrars' offices.
[3] Total death rates are per 1,000 enumerated populations as of Apr. 1, 1940, and infant mortality rates are per 1,000 estimated live births.
[4] The final infant death rate is the number of deaths under 1 year per 1,000 live births, based upon tabulations of transcripts received from State registrars' offices.

DEATHS DURING WEEK ENDED JANUARY 16, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Jan. 16, 1943	Corresponding week, 1942
Data from 90 large cities of the United States:		
Total deaths	10,316	9,807
Average for 3 prior years	9,674	
Total deaths, first 2 weeks of year	21,022	19,656
Deaths under 1 year of age	748	589
Average for 3 prior years	575	
Deaths under 1 year of age, first 2 weeks of year	1,536	1,217
Data from industrial insurance companies:		
Policies in force	65,745,481	64,887,805
Number of death claims	14,619	13,432
Death claims per 1,000 policies in force, annual rate	11.6	10.8
Death claims per 1,000 policies, first 2 weeks of year, annual rate	10.9	10.1

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 23, 1943

Summary

Of the nine common communicable diseases included in the following tables, figures for the current week for only two, influenza and meningococcus meningitis, are above the 5-year (1938–42) medians. For three other diseases, measles, scarlet fever, and typhoid fever, increases were shown over cases reported for the preceding week.

A total of 354 cases of meningococcus meningitis was reported, as compared with 298 for the preceding week, and more than reported in any week since the peak of incidence in 1936 was reached with the report of the same number for the week ended March 28. Current reports show increased incidence in all of the 9 geographic divisions except the New England, West North Central, and Pacific States, with largest numbers reported in New York (48), California (30), Rhode Island (25), Oregon (22), Virginia (19), and South Carolina (18).

The number of influenza cases reported for the week, 4,387, is only very slightly above the figures for the preceding week and the corresponding 5-year median. Of the current total, 3,524 cases, 80 percent, were reported in the South Atlantic and West South Central States. Texas, Virginia, and South Carolina reported, respectively, 1,661, 763, and 681 cases.

Other reports for the week include 3 cases of anthrax (2 in Pennsylvania and 1 in Louisiana), 185 cases of dysentery (22 amebic, 140 bacillary, and 23 unspecified), 7 cases of infectious encephalitis, 1 case of leprosy (in Texas), 16 cases of tularemia, and 61 cases of typhus fever.

Deaths reported during the week ended January 23 in 87 large cities of the United States totaled 9,782; for the preceding week, 10,050. Cumulative figures for the first 3 weeks of the year are, for 1943, 30,270; 1942, 28,184.

Telegraphic morbidity reports from State health officers for the week ended January 23, 1943, and comparison with corresponding week of 1942, and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	Jan. 23, 1943	Jan. 24, 1942		Jan. 23, 1943	Jan. 24, 1942		Jan. 23, 1943	Jan. 24, 1942		Jan. 23, 1943	Jan. 24, 1942	
NEW ENG.												
Maine	0	0	0	5	-	5	29	261	102	8	1	0
New Hampshire	1	0	0	-	-	-	29	7	7	1	0	0
Vermont	0	0	0	-	-	-	330	10	13	0	0	0
Massachusetts	0	3	5	-	-	-	425	284	284	8	1	0
Rhode Island	1	1	0	-	1	-	17	88	1	25	0	0
Connecticut	0	2	3	8	2	10	375	143	121	4	0	0
MID. ATL.												
New York	25	20	20	[1] 24	[1] 11	[1] 19	971	346	400	48	3	5
New Jersey	10	8	15	18	10	12	478	167	167	8	2	2
Pennsylvania	10	17	30	4	-	-	2, 077	1, 214	1, 214	12	3	3
E. NO. CEN.												
Ohio	8	7	21	18	29	9	82	96	96	9	2	1
Indiana	0	8	19	16	14	28	137	67	55	7	0	1
Illinois	8	24	25	11	34	42	177	104	104	8	1	1
Michigan [2]	5	15	12	4	5	5	129	176	511	9	0	0
Wisconsin	4	3	1	101	20	52	434	179	378	1	0	0
W. NO. CEN.												
Minnesota	3	1	1	-	2	3	11	326	206	3	1	1
Iowa	3	3	4	15	1	8	95	62	62	1	0	0
Missouri	11	8	14	12	12	70	45	82	15	5	0	1
North Dakota	1	2	2	41	14	14	14	80	19	1	0	0
South Dakota	0	6	2	-	-	-	74	6	6	0	0	0
Nebraska	1	0	2	51	-	-	69	43	20	2	0	0
Kansas	2	2	7	11	17	17	166	135	169	9	1	1
SO. ATL.												
Delaware	1	3	0	-	-	-	3	7	7	0	1	0
Maryland [2]	5	7	9	27	6	20	19	243	15	13	2	2
Dist. of Col.	0	3	3	6	3	6	17	17	7	2	1	0
Virginia	12	8	12	763	362	362	116	195	194	19	4	1
West Virginia	6	11	11	12	38	40	5	190	58	3	1	3
North Carolina	19	17	27	27	31	35	5	777	521	8	1	1
South Carolina	9	6	6	681	653	865	5	154	70	18	1	1
Georgia	4	10	11	66	101	143	10	130	64	2	0	0
Florida	7	9	9	13	8	8	12	49	40	3	1	1
E. SO. CEN.												
Kentucky	6	7	8	16	21	37	284	38	65	3	1	1
Tennessee	9	5	12	78	81	159	36	111	71	6	1	1
Alabama	6	20	13	107	433	433	6	72	87	4	2	1
Mississippi [2]	6	8	11	-	-	-	-	-	-	11	0	1
W. SO. CEN.												
Arkansas	10	3	11	148	186	218	63	175	61	0	0	0
Louisiana	7	11	11	7	8	21	57	24	5	11	2	1
Oklahoma	5	10	13	113	148	177	1	183	12	2	0	0
Texas	58	71	44	1, 661	1, 553	1, 405	44	1, 097	195	10	9	1
MOUNTAIN												
Montana	1	0	0	-	9	9	54	54	12	2	0	0
Idaho	0	5	0	-	-	1	228	22	5	1	0	0
Wyoming	0	0	0	61	70	3	10	13	9	3	0	0
Colorado	12	6	8	57	77	73	158	190	64	0	0	0
New Mexico	3	0	1	2	-	21	15	53	49	0	1	1
Arizona	2	2	6	103	100	132	14	201	9	3	0	0
Utah [2]	3	0	0	7	105	75	343	38	38	7	0	0
Nevada	0	0	-	-	-	-	5	0	-	0	0	-
PACIFIC												
Washington	8	0	0	1	12	9	594	35	60	2	2	1
Oregon	0	1	2	33	53	56	308	116	102	22	0	0
California	20	16	20	59	112	131	177	1, 621	246	30	7	3
Total	312	369	415	4, 387	4, 332	4, 332	8, 807	9, 681	9, 284	354	52	52
3 weeks	1, 014	1, 127	1, 446	12, 569	12, 026	12, 026	25, 214	25, 839	25, 839	941	165	155

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended January 23, 1943, and comparison with corresponding week of 1942, and 5-year median—Continued

Division and State	Poliomyelitis: Week ended— Jan. 23, 1943	Poliomyelitis: Week ended— Jan. 24, 1942	Poliomyelitis: Median 1938–42	Scarlet fever: Week ended— Jan. 23, 1943	Scarlet fever: Week ended— Jan. 24, 1942	Scarlet fever: Median 1938–42	Smallpox: Week ended— Jan. 23, 1943	Smallpox: Week ended— Jan. 24, 1942	Smallpox: Median 1938–42	Typhoid and paratyphoid fever: Week ended— Jan. 23, 1943	Typhoid and paratyphoid fever: Week ended— Jan. 24, 1942	Typhoid and paratyphoid fever: Median 1938–42
NEW ENG.												
Maine	0	0	0	9	26	11	0	0	0	0	0	0
New Hampshire	0	0	0	5	12	12	0	0	0	0	0	0
Vermont	0	0	0	4	7	7	0	0	0	0	0	0
Massachusetts	1	0	0	363	374	195	0	0	0	1	6	1
Rhode Island	0	0	0	21	33	8	0	0	0	0	0	0
Connecticut	0	0	0	89	38	68	0	0	0	1	0	1
MID. ATL.												
New York	0	2	2	372	359	461	0	0	0	4	6	7
New Jersey	1	2	0	109	112	146	0	0	0	0	0	1
Pennsylvania	0	3	1	285	278	422	0	0	0	6	6	6
E. NO. CEN.												
Ohio	1	3	2	311	320	300	5	0	0	1	4	2
Indiana	2	0	0	100	107	142	4	3	3	1	1	1
Illinois	1	2	0	221	265	449	2	2	2	2	2	2
Michigan [3]	0	3	0	121	399	399	0	0	0	1	1	2
Wisconsin	0	1	1	276	166	166	0	0	12	1	0	0
W. NO. CEN.												
Minnesota	0	0	0	75	106	139	0	2	11	0	0	0
Iowa	0	0	0	49	63	87	0	0	9	7	1	1
Missouri	1	1	0	91	86	86	0	3	5	0	0	3
North Dakota	0	1	0	11	44	10	1	1	1	0	0	1
South Dakota	0	1	0	12	49	23	0	0	2	0	0	0
Nebraska	2	0	0	24	38	31	0	1	1	0	0	0
Kansas	0	0	0	71	79	94	2	2	2	0	0	0
SO. ATL.												
Delaware	0	0	0	14	62	18	0	0	0	0	0	0
Maryland [3]	0	0	0	48	68	62	0	0	0	0	4	4
Dist. of Col.	0	0	0	28	15	15	0	0	0	4	0	0
Virginia	3	0	0	48	52	39	0	0	0	4	3	3
West Virginia	0	0	0	35	91	60	1	0	0	0	1	1
North Carolina	1	2	1	73	53	58	0	0	0	0	1	1
South Carolina	0	0	0	7	14	14	0	0	0	1	1	3
Georgia	0	0	0	24	17	19	1	0	0	2	3	2
Florida	0	0	0	21	3	3	0	0	0	1	4	0
E. SO. CEN.												
Kentucky	0	0	0	36	114	86	0	0	0	2	1	1
Tennessee	1	0	0	88	78	78	0	0	0	0	2	2
Alabama	1	1	1	23	37	26	2	0	0	0	4	3
Mississippi [3]	0	0	1	15	13	13	1	0	0	0	0	0
W. SO. CEN.												
Arkansas	0	0	0	6	11	9	0	0	5	0	5	4
Louisiana	0	2	1	12	5	12	1	0	0	7	13	11
Oklahoma	0	0	0	7	15	26	0	0	4	0	2	2
Texas	6	1	1	52	82	93	1	4	4	4	10	10
MOUNTAIN												
Montana	0	0	0	15	20	26	0	0	0	1	0	0
Idaho	0	0	0	14	15	15	0	1	1	0	1	1
Wyoming	0	0	0	65	7	7	0	0	0	0	0	0
Colorado	0	0	0	54	24	46	0	0	8	3	1	0
New Mexico	0	0	0	10	2	14	0	0	0	1	0	0
Arizona	1	0	0	11	8	8	0	0	0	0	0	0
Utah [3]	1	1	0	75	35	28	0	0	0	1	0	0
Nevada	0	0	------	0	0	--------	0	0	------	0	0	----
PACIFIC												
Washington	1	1	1	27	32	62	0	1	1	0	2	2
Oregon	0	0	0	14	19	35	1	0	2	3	1	1
California	1	1	1	194	128	154	0	0	12	2	3	5
Total	25	28	28	3,655	3,981	4,229	22	20	80	61	89	91
3 weeks	105	85	85	10,749	10,374	11,960	103	41	264	155	243	250

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended January 23, 1943, and comparison with corresponding week of 1942, and 5-year median—Continued

Division and State	Whooping cough, Week ended—, Jan. 23, 1943	Whooping cough, Week ended—, Jan. 24, 1942	Whooping cough, Median 1938–42	Anthrax	Dysentery, Amebic	Dysentery, Bacillary	Dysentery, Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
				Week ended Jan. 23, 1943								
NEW ENG.												
Maine	78	52	52	0	0	0	0	0	0	0	0	0
New Hampshire	2	5	5	0	0	0	0	0	0	0	0	0
Vermont	34	33	33	0	0	0	0	0	0	0	0	0
Massachusetts	206	296	216	0	0	0	0	2	0	0	0	0
Rhode Island	27	92	13	0	0	0	0	0	0	0	0	0
Connecticut	47	135	75	0	0	0	0	1	0	0	0	0
MID. ATL.												
New York	467	578	451	0	5	9	0	0	0	0	0	0
New Jersey	144	257	160	0	0	0	0	0	0	0	0	0
Pennsylvania	394	330	373	2	1	0	0	0	0	0	0	0
E. NO. CEN.												
Ohio	208	306	197	0	0	0	0	0	0	0	0	0
Indiana	16	52	28	0	0	0	0	0	0	0	1	0
Illinois	212	286	133	0	0	37	0	0	0	0	7	0
Michigan [2]	370	434	349	0	0	0	0	0	0	0	0	0
Wisconsin	201	364	150	0	0	0	0	0	0	0	0	0
W. NO. CEN.												
Minnesota	67	27	63	0	1	1	0	0	0	0	0	0
Iowa	28	28	28	0	0	0	0	0	0	0	0	0
Missouri	9	11	15	0	0	0	0	0	0	0	1	0
North Dakota	0	21	21	0	0	0	0	0	0	0	0	0
South Dakota	7	5	5	0	0	0	0	0	0	0	0	0
Nebraska	6	9	9	0	0	0	0	0	0	0	0	0
Kansas	26	61	61	0	0	0	0	1	0	0	0	0
SO. ATL.												
Delaware	11	0	7	0	0	0	0	0	0	0	0	0
Maryland [2]	76	41	62	0	0	0	2	0	0	0	0	0
Dist. of Columbia	20	26	14	0	0	0	0	0	0	0	0	0
Virginia	110	45	45	0	0	0	10	0	0	0	3	0
West Virginia	59	79	59	0	0	0	0	0	0	0	0	0
North Carolina	146	250	323	0	0	1	0	0	0	0	0	3
South Carolina	21	41	47	0	0	0	0	0	0	0	1	6
Georgia	39	16	20	0	0	2	0	1	0	0	0	17
Florida	20	27	14	0	5	0	0	0	0	0	0	2
E. SO. CEN.												
Kentucky	27	94	77	0	0	0	0	0	0	0	0	0
Tennessee	87	18	35	0	0	0	0	1	0	0	0	1
Alabama	21	9	29	0	0	0	0	1	0	0	0	2
Mississippi [2]				0	0	0	0	0	0	0	0	1
W. SO. CEN.												
Arkansas	61	14	14	0	0	4	0	0	0	0	1	1
Louisiana	5	1	4	1	2	0	0	0	0	0	1	5
Oklahoma	13	13	13	0	1	0	0	0	0	0	0	0
Texas	288	92	111	0	4	76	0	0	1	0	0	21
MOUNTAIN												
Montana	32	16	16	0	0	0	0	0	0	0	0	0
Idaho	2	8	8	0	0	0	0	0	0	0	0	0
Wyoming	10	0	8	0	0	0	0	0	0	0	0	0
Colorado	34	41	33	0	0	0	0	0	0	0	0	0
New Mexico	29	50	32	0	0	0	0	0	0	0	0	0
Arizona	9	54	15	0	0	0	11	0	0	0	0	0
Utah [2]	30	54	50	0	0	0	0	0	0	0	0	0
Nevada	1	2		0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	16	169	103	0	1	1	0	0	0	0	0	0
Oregon	8	54	21	0	0	0	0	0	0	0	0	0
California	411	222	222	0	2	9	0	0	0	0	1	2
Total	4,135	4,818	4,537	3	22	140	23	7	1	0	16	61
3 weeks	12,037	12,546	12,546									

[1] New York City only.
[2] Period ended earlier than Saturday.

WEEKLY REPORTS FROM CITIES

City reports for week ended January 9, 1943

This table lists the reports from 85 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga.	0	0	30	0	4	0	3	0	8	0	1	6
Baltimore, Md.	4	0	7	3	5	12	27	0	22	0	0	59
Barre, Vt.	0	0	-	0	1	0	0	0	0	0	0	0
Billings, Mont.	0	0	-	0	2	0	0	0	2	0	0	0
Birmingham, Ala.	0	0	7	1	2	3	3	0	4	0	0	0
Boston, Mass.	0	0	-----	1	106	3	19	0	114	0	0	50
Bridgeport, Conn.	0	0	-----	0	0	0	4	0	12	0	0	5
Brunswick, Ga.	0	0	-----	0	0	0	2	0	0	0	0	3
Buffalo, N. Y.	0	0	-----	0	140	1	9	1	19	0	0	32
Camden, N. J.	1	0		0	33	0	4	0	4	0	0	3
Charleston, S. C.	0	0	93	1	0	0	5	1	1	0	0	0
Charleston, W. Va.	0	0		0	0	0	0	0	1	0	0	0
Chicago, Ill.	1	0	5	3	90	0	32	0	82	0	0	68
Cincinnati, Ohio	0	0	5	1	14	0	4	0	15	0	0	6
Cleveland, Ohio	0	0	6	1	2	0	7	1	33	0	0	95
Columbus, Ohio	0	0	2	2	0	1	4	0	16	0	0	2
Cumberland, Md.	0	0	----	0	0	0	1	0	0	0	0	0
Dallas, Tex.	0	0	----	0	0	0	9	0	5	0	2	9
Denver, Colo.	7	0	29	0	52	1	8	0	8	0	0	2
Detroit, Mich.	3	0	--	2	15	2	29	1	38	0	0	145
Duluth, Minn.	0	0	----	0	0	0	3	0	1	0	0	0
Fall River, Mass.	1	0	---	1	2	1	4	0	2	0	0	15
Fargo, N. Dak.	0	0	-----	0	0	0	0	0	0	0	0	0
Flint, Mich.	1	0	-----	0	0	0	1	0	4	0	0	5
Fort Wayne, Ind.	0	0	---	0	0	0	4	0	0	0	1	1
Frederick, Md.	0	0	---	0	0	0	0	0	0	0	0	0
Galveston, Tex.	1	0	--	0	0	1	3	0	2	0	0	2
Grand Rapids, Mich.	0	0	1	1	0	0	4	0	5	0	0	7
Great Falls, Mont.	0	0	-----	0	1	0	1	0	0	0	0	3
Hartford, Conn.	0	0	-----	0	10	0	6	0	2	0	2	0
Helena, Mont.	0	0	---	0	0	0	1	0	0	0	0	0
Houston, Tex.	3	0	-----	1	0	0	7	0	0	1	0	1
Indianapolis, Ind.	3	0	--	0	60	1	6	0	24	0	0	6
Kansas City, Mo.	1	1	-	1	8	1	11	0	29	0	0	7
Kenosha, Wis.	0	0	-	0	0	0	0	0	2	0	0	0
Little Rock, Ark.	0	0	5	0	0	0	1	0	0	0	0	0
Los Angeles, Calif.	3	0	18	2	15	2	9	0	30	0	0	27
Lynchburg, Va.	0	0	----	0	0	0	0	0	0	0	0	0
Memphis, Tenn.	0	0	2	4	1	1	8	0	9	0	0	7
Milwaukee, Wis.	0	0	3	3	125	0	11	0	108	0	0	30
Minneapolis, Minn.	0	0	-----	0	3	0	6	1	17	0	0	11
Missoula, Mont.	0	0	----	0	0	0	0	0	0	0	0	4
Mobile, Ala.	0	0	3	3	1	0	1	0	1	0	0	3
Nashville, Tenn.	0	0	-----	1	7	0	4	0	0	0	0	0
Newark, N. J.	0	0	13	0	25	2	11	0	14	0	0	11
New Haven, Conn.	0	0	----	0	0	0	2	0	0	0	0	9
New Orleans, La.	0	0	2	1	3	3	16	0	7	0	2	3
New York, N. Y.	23	1	17	4	27	16	91	0	216	0	1	84
Omaha, Nebr.	0	0	------	0	1	0	4	0	7	0	0	0
Philadelphia, Pa.	5	0	7	0	1,141	8	0	0	64	0	0	79
Portland, Maine	0	0	----	0	2	4	8	0	3	0	0	42
Providence, R. I.	2	0	25	0	3	3	9	1	12	0	0	19
Pueblo, Colo.	1	0	------	0	1	0	1	0	5	0	0	0
Racine, Wis.	0	0	------	0	73	0	0	0	29	0	0	0
Raleigh, N. C.	0	0	------	0	0	0	1	0	0	0	0	7
Reading, Pa.	0	0	------	0	86	0	3	0	2	0	0	20
Richmond, Va.	1	0	2	2	0	3	2	0	4	0	0	7

City reports for week ended January 9, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Roanoke, Va	2	0		0	0	0	0	0	1	0	0	0
Rochester, N. Y	0	0		0	6	0	6	0	6	0	0	14
Sacramento, Calif	11	0		0	14	0	4	0	6	0	1	17
Saint Joseph, Mo	0	0		0	0	0	3	0	4	0	0	0
Saint Louis, Mo	0	0	2	1	3	5	20	1	12	0	0	8
Saint Paul, Minn	0	0		0	0	0	11	0	2	0	0	55
Salt Lake City, Utah	1	0		2	224	1	1	0	17	0	0	7
San Antonio, Tex	1	0	2	0	1	0	4	0	1	0	0	9
San Francisco, Calif	0	0	8	0	16	3	21	0	10	0	0	29
Savannah, Ga	0	0	2	2	0	0	5	0	0	0	0	0
Seattle, Wash	4	0		2	34	0	7	0	1	0	0	7
Shreveport, La	2	0		0	0	1	10	0	2	0	1	0
South Bend, Ind	0	0		0	1	0	0	0	0	0	0	1
Spokane, Wash	0	0		0	80	1	2	0	0	0	0	3
Springfield, Ill	0	0		0	0	0	6	0	2	0	0	30
Springfield, Mass	0	0		0	5	0	3	0	59	0	0	0
Superior, Wis	0	0		0	1	0	0	0	8	0	0	4
Syracuse, N. Y	0	0		0	3	1	6	0	1	0	0	28
Tacoma, Wash	0	0		1	44	0	5	0	0	0	0	0
Topeka, Kans	0	0		0	14	0	5	0	2	0	0	0
Trenton, N. J	2	0	3	0	0	0	6	0	5	0	0	14
Washington, D. C	0	0	5	1	9	2	9	1	15	0	0	20
Wheeling, W. Va	0	0		0	0	0	5	0	0	0	0	3
Wichita, Kans	2	0	2	2	3	0	1	0	2	0	0	1
Wilmington, Del	0	0		0	2	0	3	0	2	0	0	0
Wilmington, N. C	0	0		0	2	0	2	0	1	0	0	1
Winston-Salem, N. C	0	0		0	1	0	0	0	1	0	0	13
Worcester, Mass	0	0		0	31	1	10	0	14	0	0	5
Total	86	2	306	50	2,556	84	564	8	1,157	1	11	1,164
Corresponding week, 1942	91	3	245	46	1,331	17	477	3	990	1	8	1,157
Average, 1938–42	112		1,693	[1] 68	[2] 2,193		[1] 523		1,104	18	18	1,092

Anthrax.—Cases Philadelphia, 1.
Dysentery, amebic.—Cases. Dallas, 2.
Dysentery, bacillary—Cases Buffalo, 1; Charleston, S. C, 9, Chicago, 1; Detroit, 2.
Dysentery, unspecified—Cases Washington, D. C., 1
Tularemia.—Cases Richmond, 1.
Typhus fever.—Cases: Birmingham, 1; Charleston, S C, 3; Houston, 5; Savannah, 2.

[1] 3-year average, 1940–42.
[2] 5-year median.

PLAGUE INFECTION IN CALIFORNIA AND WASHINGTON

CALIFORNIA—SISKIYOU COUNTY

Under date of January 8, 1943, plague infection was reported proved in pools of fleas from field mice, *Microtus* sp., and ground squirrels, *C. douglasii*, collected in June 1942, in Siskiyou County, Calif., as follows: June 5, 8 fleas from 16 field mice taken 8 miles east and 3 miles south of Montague, and 118 fleas from 8 ground squirrels taken 4 miles north of Montague; June 8, 91 fleas from 7 ground squirrels taken 9 miles northeast of Ager; June 10, 96 fleas from 15 ground squirrels taken 7 miles east of Grenada, and 101 fleas from 17 ground squirrels taken 6 miles south of Yreka.

WASHINGTON—TACOMA

Plague infection has been reported proved in tissue and pools of fleas from rats, *R. norvegicus*, collected in Tacoma, Wash., as follows: December 24, 1942, in tissue from 1 rat; December 30, 88 fleas from 85 rats; January 2, 1943, 108 fleas from 107 rats, and 30 fleas from 54 rats.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—November 1942.—During the month of November 1942, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	11		10		2		5		28	
Diphtheria	[1] 4	2	1		[2] 8		2		15	2
Dysentery (amebic)	3		2				5		10	
Dysentery (bacillary)	1						4	3	5	3
Leprosy							1	2	1	2
Lethargic encephalitis	1								1	
Malaria [3]	16	1	3		371	1	120	1	510	3
Measles	1				9		1		11	
Meningitis, meningococcus					1	1			1	1
Mumps	10				2				12	
Paratyphoid fever	1				1		3	1	5	1
Pneumonia		9		6	66	4		3	[4] 66	22
Tuberculosis		27		5	2	1		7	[4] 2	40
Typhoid fever	1						2	1	3	1
Whooping cough					3				[4] 3	

[1] Includes 1 carrier.
[2] Includes 7 carriers.
[3] Includes 189 recurrent cases.
[4] Cases reported in the Canal Zone only.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended December 26, 1942.—During the week ended December 26, 1942, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis				3	4	1			1	9
Chickenpox	1	29	2	165	302	65	75	5	45	689
Diphtheria	1	18		31	2	3	1	2		58
German measles		1		5	11		1		2	20
Influenza		2							3	5
Measles		3	1	78	125	16	90		14	327
Mumps	1	67		37	510	76	79	9	108	887
Pneumonia	2	17			7	3			10	39
Poliomyelitis				1		1	1			3
Scarlet fever		4	1	74	97	15	22	10	27	250
Trachoma									1	1
Tuberculosis	2	3	6	77	47				7	142
Typhoid and paratyphoid fever				8		1			1	10
Whooping cough		33		105	68	37	2	6	4	255
Other communicable diseases	1	4		8	179		5	1	1	199

SWEDEN

Notifiable diseases—October 1942.—During the month of October 1942, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	17	Poliomyelitis	171
Diphtheria	163	Scarlet fever	2,108
Dysentery	148	Syphilis	65
Epidemic encephalitis	19	Typhoid fever	35
Gonorrhea	1,513	Undulant fever	2
Paratyphoid fever	3	Weil's disease	9

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates

Place		January-October 1942	November 1942	December 1942—week ended—			
				5	12	19	26
ASIA							
Ceylon	C	102					
China:							
Kunming (Yunnanfu)	C	804[1]					
Shanghai	C	844					
India	C	105,594	13,740				
Calcutta	C	2,144	78	32			
Chittagong	C	55					
Madras	C	13	7	3	1	22	
Rangoon	C	1					
India (French)	C	10					

[1] For the period May 12 to July 4, 1942.

PLAGUE

[C indicates cases, P, present]

Place		January-October 1942	November 1942	December 1942—week ended—			
				5	12	19	26
AFRICA							
Basutoland	C	10					
Belgian Congo	C	4					
British East Africa:							
Kenya	C	703	21	1	1	3	
Nairobi	C	67					
Uganda	C	338	4	2	2		
Egypt: Port Said	C	3					
Madagascar	C	92	3				
Morocco	C	349					
Rhodesia, Northern	C	2			[1] 11		
Senegal	C	[2] 6					
Union of South Africa	C	69	8	6			
ASIA							
China [3]							
India	C	1,063	80				
Indochina (French)	C	77	4				
Palestine:							
Haifa	C	5					
Jaffa	C		1			[4] 3	[4] 3
EUROPE							
Portugal: Azores Islands	C	1					
NORTH AMERICA							
Canada: Alberta Province—Plague-infected fleas		P					
SOUTH AMERICA							
Argentina. Cordoba Province	C	26					
Brazil:							
Alagoas State	C	3					
Pernambuco State	C	6					
Chile. Valparaiso	C	1					
Ecuador: [5] Loja Province	C				1		
Peru:							
Ancash Department	C	6					
Lambayeque Department	C	3					
Libertad Department	C	7					
Salaverry—Plague-infected rats		P					
Lima Department	C	55	1				
Lima	C	18					
Piura Department	C	15	6				
OCEANIA							
Hawaii Territory: Plague-infected rats		53	56	4	7		2
New Caledonia	C	[6] 1	1				

[1] Period not specified.
[2] Includes 4 suspected cases.
[3] Plague has been reported in China as follows. Chekiang Province, Apr. 1-10, 1942, 4 cases; Fukien Province, Jan. 1-Apr. 5, 1942, plague appeared in 11 localities; Hunan Province, week ended Apr. 18, 1942, 2 cases; Suiyuan Province, pneumonic plague appeared in epidemic form during the period Jan. 1-Apr. 4, 1942, in the northwestern area
[4] At Jaffa and vicinity.
[5] For the year 1942, 1 death from plague was reported in Chimborazo Province and 4 cases and 1 death in Loja Province, Ecuador.
[6] Pneumonic.

SMALLPOX

[C indicates cases]

Place		January-October 1942	November 1942	December 1942—week ended—			
				5	12	19	26
AFRICA							
Algeria	C	767					
Belgian Congo	C	431	90	17	43		
British East Africa: Tanganyika	C	50	10				
Dahomey	C	56					
French Guinea	C	134					
Gold Coast	C	1,224	17	4			
Ivory Coast	C	50	21				
Morocco	C	1,536					
Nigeria	C	2,085	136				
Niger Territory	C	986					
Portuguese East Africa	C	51					
Rhodesia:							
Northern	C	9					
Southern	C	1					
Senegal	C	17					
Sudan (French)	C	296					
Tunisia	C	1					
Union of South Africa	C	1,055					
Zanzibar	C	[1] 2					
ASIA							
Ceylon	C	7					
China	C	9					
India	C	29,138	644				
Indochina (French)	C	3,423	188				
Iran	C	87	23				
Iraq	C	252	31	8		2	
Palestine	C		4	5			
Syria and Lebanon	C	878	755	132	96		
Trans-Jordan	C	3					
EUROPE							
France:							
Seine Department	C	44					
Unoccupied zone	C	13					
Great Britain:							
England and Wales	C	5					
Scotland	C	65	15	2			
Ireland (Northern)	C		1				
Portugal	C	52	1			3	
Spain	C	208	3				
Turkey	C	564	285	142	118		[2] 300
NORTH AMERICA							
Canada	C	5					
Guatemala	C	[3] 6	1				
Mexico	C	110					
Panama Canal Zone	C	[4] 1					
SOUTH AMERICA							
Argentina	C		[5] 74				
Brazil	C	1					2
Colombia	C	528					
Ecuador	C		4		2		
Peru	C	[6] 1,147	4				
Venezuela (alastrim)	C	150					

[1] Imported.
[2] For 2 weeks.
[3] For September.
[4] In the Canal Zone.
[5] For the week ended Nov. 23.
[6] For January to June.

TYPHUS FEVER

[C indicates cases]

Place		January–October 1942	November 1942	December 1942—week ended—			
				5	12	19	26
AFRICA							
Algeria	C	35,115					
Basutoland	C	32					
British East Africa: Kenya	C	18	2	1		2	
Egypt	C	22,824	151	105	150		
Ivory Coast	C	4					
Morocco	C	25,804					
Nigeria	C	5					
Niger Territory	C	1					
Rhodesia (Northern)	C	1					
Senegal	C	[1] 3					
Sierra Leone	C	7					
Tunisia	C	16,295					
Union of South Africa	C	931					
ASIA							
China	C	318					
India	C	9		1			
Indochina	C		10				
Iran	C	882	8				
Iraq	C	95	5	2			
Palestine	C	165	21	2		6	12
Syria and Lebanon	C	23	1		2		
Trans-Jordan	C	6					
EUROPE							
Bulgaria	C	647	5		10		
Czechoslovakia	C	5					
France:							
Seine Department	C	1					
Unoccupied zone	C	229					
Germany	C	1,817					
Hungary	C	757	16	8	6	14	19
Irish Free State	C	19	9			1	
Portugal	C	1					
Rumania	C	3,512	117	75	132		157
Slovakia	C		2		4		
Spain	C	3,870					
Canary Islands	C	1					
Switzerland	C	3					
Turkey	C	350	36	7	11		23
Union of Soviet Socialist Republics	C	67					
NORTH AMERICA							
Guatemala	C	188	41				
Jamaica	C	47	3	1	1	1	
Mexico	C	583	56				
Panama Canal Zone	C	1					
Puerto Rico	C	3	1				
SOUTH AMERICA							
Chile	C	107					
Colombia	C	4					
Ecuador	C	137	21	3	4		4
Peru	C	923					
Venezuela	C	20					
OCEANIA							
Australia	C	29					
Hawaii Territory	C	42	2	2	2		

[1] Suspected.

YELLOW FEVER

[C indicates cases; D deaths]

Place		January-October 1942	November 1942	December 1942—week ended—			
				5	12	19	26
AFRICA							
Belgian Congo: Libenge	D	[1] 1					
British East Africa: Kenya	C	1					
French West Africa	C	1					
Gold Coast	C	[2] 3					
Ivory Coast	C	[2] 7					
Nigeria	C	[3] 3					
Senegal [4]	D	1					
Sierra Leone: Freetown	C	2					
Sudan (French)	D	[3] 2					
Togo	C	2					
SOUTH AMERICA [5]							
Bolivia:							
Chuquisaca Department	D	1					
La Paz Department	C	7					
Santa Cruz Department	C	18					
Brazil:							
Acre Territory	D	4					
Bahia State	D	1					
Para State	D	1					
Colombia:							
Boyaca Department	D	5					
Cundinamarca Department	D	4					
Intendencia of Meta	D	4					
Santander Department	D	4					
Venezuela: Bolivar State	C	2					

[1] Suspected.
[2] Includes 2 suspected cases.
[3] Includes 1 suspected case
[4] According to information dated Feb. 9, 1942, 15 deaths from yellow fever among Europeans have occurred in Senegal.
[5] All yellow fever in South America is of the jungle type unless otherwise specified.

X

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

THE PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements, should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 58 FEBRUARY 5, 1943 NUMBER 6

IN THIS ISSUE

U.S. PUBLIC HEALTH SERVICE 1798

CONTENTS

PREVALENCE OF DISEASE

Public Health Reports

Vol. 58 • FEBRUARY 5, 1943 • *No. 6*

THE IDENTIFICATION AND LOCALIZATION OF LEAD IN BONE TISSUE[1]

By LAWRENCE T. FAIRHALL, *Principal Industrial Toxicologist, United States Public Health Service*

Although storage of lead in bone tissue had previously been referred to by several investigators, it was in effect rediscovered by Minot (*1*) and added significance given to its presence in that particular tissue. Previously, its presence in bone tissue had been generally regarded somewhat as accidental. As early as 1861, Gusserow (*2*) demonstrated the presence of lead in bone tissue and ascribed this deposition to the formation of a compound of lead with calcium. However, Gusserow's experiments were buried in oblivion for nearly 60 years. Other investigators occasionally published data concerning the lead content of bone tissue, but these data were considered as incidental to the rather widespread deposition of lead throughout the tissues. At various times the lead content of the brain, liver, and kidneys has been considered of prime importance and it has also been assumed by some that in whichever tissue the degree of deposition was greatest, tissue damage at that site would be correspondingly great.

The lead stored in bone tissue is of great significance in the study of lead poisoning; in a sense the behavior of lead in the organism as a whole is dependent upon the efficiency of this storage. The composition, manner of deposition, and site of deposition are therefore of importance particularly with reference to low grade lead absorption and incipient plumbism. Certain factors may modify the degree of lead storage in bone tissue, but storage in bone is less affected by various conditions than is storage in the softer tissues.

Up to a certain point, the human organism can tolerate absorption of lead by efficiently excreting it. Beyond this point, whether the lead enters the system by ingestion or by inhalation, the excretory mechanism is not the sole means adopted to meet this danger. It is perhaps fortunate that the properties of lead are such that precipitation of lead occurs in the bone tissue, so that the circulating lead can be kept to a minimum.

[1] From the Division of Industrial Hygiene, National Institute of Health.

The impression is common that since lead is an accumulative poison, all of the lead absorbed is stored. However, the proportion of storage in relation to the amount absorbed is still not known, and little is known about the persistence of the bone-stored lead.

It was recently found that not all compounds of lead produce the same amount of bone lead deposition (*3*). When equivalent amounts of lead are fed both as carbonate and as arsenate, much more lead is deposited as a result of absorption from the carbonate than from the arsenate. This cannot be ascribed entirely to differences in solubility of the two, since lead arsenate is so completely broken down in the body that the greater part of the arsenic is excreted through the kidneys (*4*).

While lead is deposited in other tissues, the quantity is neither as great nor is it immobilized to the extent that it is in bone tissue. It appears, in fact, to be quite loosely held in the liver and kidneys as compared with the bones. While it was shown, as stated above (Minot, loc. cit.), that lead tends to be fixed in the bones and in time to decrease in amount in the softer tissues, the mobility of lead outside the osseous system nevertheless has not been fully appreciated. Recent experimental work (*5*) has shown that in as short a period of time as two weeks the liver and kidney content of stored lead may be diminished by 50 percent after restoration to a normal diet. Compared with the bones, storage in the soft tissues would therefore appear to be incidental.

Far less has been accomplished with reference to the question of the site of deposition in the bone tissue apart from the question of gross storage. Since the bone trabeculae are the first to be affected in bone changes, this would also appear to be the logical site of initial lead deposition. Minot and Aub (*6*) showed that this bone material was especially rich in lead. Behrens and Baumann (*7*), using Thorium B as an indicator, found the epiphyseal zone to be richest in lead following intravenous injection. The demonstration of lead in bone by Thorium B or by analytical means, however, localizes it only in a gross sense. The microscopic demonstration and identification of lead *in situ* in bone has been difficult heretofore owing to the colloidal nature of the material in which lead is deposited, the irregularity of deposition, and the insolubility of the deposited lead compound.

Sulfide staining which has been advocated at various times (*8, 9*) to demonstrate lead deposits in tissues is frequently uncertain and indefinite. Lead salts in the presence of protein usually give only a faint generalized stain which is not always apparent under the microscope—particularly in the early stages of lead absorption. However, sulfide staining in the later stages of lead deposition when granular deposits are present and in connection with other methods is very useful. Sieber (loc. cit., p. 275) decalcified bone in formic

acid containing hydrogen sulfide and used dark-field illumination to demonstrate the particulate material.

In the present investigation, it was shown that this particulate material may be demonstrated directly by dark-field illumination without treatment with hydrogen sulfide and furthermore that only the surface of the deposited lead compound is darkened by the sulfide.

Since particulate lead has been demonstrated in lung tissue by a slow crystallization of the very insoluble lead chromate in acetic acid solution (*10*), this procedure was tried with bone tissue known to contain lead. It was found that, although slow in action, lead chromate would crystallize under these conditions. It usually requires several days for this to occur owing to the great insolubility of the deposited lead. The lead deposit apparently dissolves very slowly and crystallizes about the particles or diffuses to the surface where it is revealed as minute crystals of lead chromate, usually too small for angular measurement and frequently somewhat irregular in shape owing to the presence of organic material. It was found possible to decalcify bone by treatment with sulfurous acid without affecting the deposited lead. Micro tests of the crystalline compound remaining in bone tissue after complete decalcification were positive for lead and for the phosphate group and indicated the likelihood that the deposited substance is a lead phosphate.

METHOD

It is preferable to saw the bone lengthwise previous to decalcification. The bone may be preserved in 10 percent formalin and is decalcified in a saturated solution of sulfur dioxide in distilled water with frequent changes. It is finally rinsed free from sulfite. Sections can be cut satisfactorily from paraffin. Decalcification of rather large pieces of bone is fairly rapid. No lead is removed from the bone in this process. Repeated analyses of the material dissolved from leaded bone, together with the washings, have been negative for lead, while analyses of similar pieces of calcified and decalcified bone check satisfactorily. Additional evidence from the examination of ground bone sections indicates that the lead deposit is not affected by the decalcifying medium.

Bone sections are carried through xylene and the alcohols to water and finally to a 1 percent potassium chromate-5 percent acetic acid solution in which they are left immersed for several days. Frequently a sufficient deposit of lead chromate crystals is evident after 24 hours, but usually immersion for a few days is advisable.

It is preferable to examine the unstained sections, under a polarizing or crystallographic microscope, since the lead chromate deposit is thrown into brilliant relief against the background, while under ordi-

nary transmitted light the crystals are occasionally difficult to detect and may escape observation. The crystals are monoclinic prisms, usually well defined (fig. 1), but occasionally distorted possibly owing to the protein medium in which they form. *Crystallization commonly* occurs in groups of minute crystals, however, rather than in single large forms (fig. 2). The crystals average 2.5 microns in length. They are soluble in hydrochloric acid, are birefringent, and have a high mean index of refraction.

DISCUSSION

The identification of lead in bone tissue by the above procedure is definite since other metal chromates are either soluble in acetic acid or can easily be differentiated from crystalline lead chromate. Thus bismuth, which might conceivably be deposited in bone tissue following medication with its derivatives, forms a chromate insoluble in water. However, precipitated bismuth chromate, being amorphous, (as verified by X-ray diffraction study) lacks any distinguishing crystallographic properties and furthermore is too soluble in 5 percent acetic acid to be a matter of consequence.

An opportunity to verify this method occurred in the examination of bones of a control dog. Microscopically, lead chromate was found to be deposited in tissues which normally should have been free of lead. Subsequent chemical analyses revealed that lead storage had occurred in this animal and thus confirmed the microscopic findings.

It was found that in addition to hydrogen sulfide, basic dyes such as methyl green stain particulate lead deposits in bone (fig. 3), and in fact this particulate lead deposit in the later stages of lead deposition is directly visible under the microscope without staining (fig. 4). However, in the earlier stages of deposition the lead is so diffused in the tissues that no particulate staining occurs with sulfide or dyes and in either case neither of these methods serves to *identify* the lead. The crystalline chromate method, on the other hand, definitely identifies the lead even in the absence of any particulate deposition (fig. 5).

Study of bone sections thus prepared from various lead-poisoned animals revealed deposits of chromate around the Haversian canals and extending in the lamellae for some distance from the center. There is no evidence of deposition along the protoplasmic processes extending to the osteocytes and no evidence that the deposit is greater about the Volkmann canals than the Haversian. The cancellous tissue is rich in lead, as might be expected. It is of interest in this connection that Behrens and Baumann (loc. cit., p. 252) report the compacta as entirely free from lead. However, the compact tissue in animals that had been poisoned over a long period of time in the present study also shows an extensive amount of deposited lead and, furthermore, lead was always demonstrable in the compact

FIGURE 1.—Ground section of tibia of lead-poisoned dog showing lead chromate crystals.

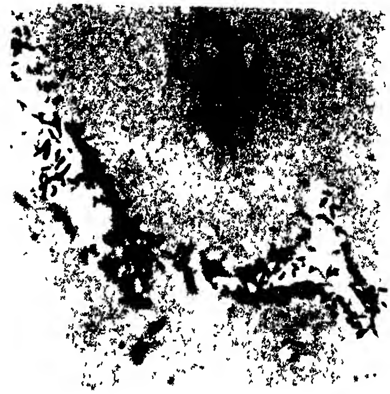


FIGURE 2.—Section of femur of lead-poisoned dog showing grouping of chromate crystals.

FIGURE 3.—Particulate lead in cancellous tissue stained with methyl green × 320.

FIGURE 4.—Unstained lead deposit in cancellous tissue of a lead-poisoned dog (humerus) × 320.

FIGURE 5.—Lead chromate crystals in a section of the compact tissue of the femur of a lead-poisoned dog.

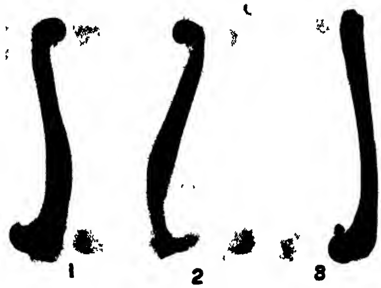


FIGURE 6.—X-ray photographs of calcified and decalcified bones of a lead-poisoned dog.

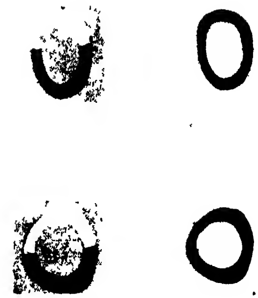


FIGURE 7.—Normal and X-ray photographs of thin sections of bone treated with lead chloride.

FIGURE 8.—Marrow from normal dog bone (femur) stained with methyl green.

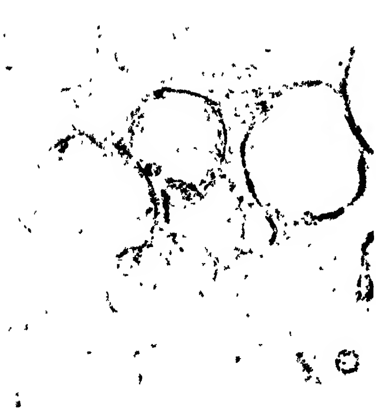


FIGURE 9. Marrow of guinea pig femur after 2 weeks of lead absorption. Unstained.

FIGURE 10.—Marrow of dog fed large amounts of lead for 8 months. Unstained.

tissue of animals exposed to lead for shorter periods of time. Conforming to Behrens' observations, the cartilage has always been found to be free from lead. The distinction frequently made between the lead content of the epiphysis and diaphysis is not as great as might be inferred from occasional analyses or from the literature in general. Analysis of the shaft of the long bones as well as the ends of the bone in the case of two lead-poisoned dogs showed the values given in table 1.

TABLE 1.—*Analyses of the epiphyses and diaphyses of bones of lead-poisoned dog*

Dogs	Amount of lead fed (grams of Pb)	Days of experiment	Portion analyzed	Femur mg/10 g	Humerus mg/10 g	Radius mg/10 g.	Ulna mg/10 g	Tibia mg/10 g.	Fibula mg/10 g	Scapula mg/10 g	Average mg/10 g.
1	7.28	260	Shaft	2.17	2.34	2.37	4.03	3.52	2.01	....	2.74
			Epiphysis	3.52	3.05	3.38	3.16	2.75	2.01	......	2.97
6	2.49	129	Shaft	2.58	2.24	2.39	2.53	3.18	2.49	2.49	2.57
			Epiphysis	2.19	2.06	2.39	2.71	1.89	2.18		2.24

It is apparent from this table that the average values for the diaphyses do not differ greatly from those of the epiphyses. Similarly, Barth (*11*) found that no differences could be established between epiphyses, diaphyses, and flat bones. A distinction, however, should be made with reference to the basis of comparison—whether it refers to moist bone samples or oven-dried samples. The epiphysis contains more water than the shaft and comparison of samples of bone dried at 105–110° C. indicates a higher percentage content of lead in the epiphysis than in the diaphysis.

Moreover, further work in progress indicates that when the calcium-lead ratios are compared, the epiphyseal values are generally somewhat greater than the diaphyseal.

The radioactivity experiments of Behrens and Baumann clearly show the greater part of the lead in the epiphysis. However, in their experiments they injected the salts containing Thorium B intravenously and since the blood supply of the epiphysis is much greater than that of the shaft, it is not surprising that a deeper shadow would be obtained in the one case than in the other. Furthermore, deposition of lead in bone tissue is ordinarily a slow process whereas these experiments were completed within a matter of hours. X-ray evidence both for and against segregation of lead into a distinct line or zone in this manner has been accumulated (*12*). The point at issue so far as this study is concerned is not that of the structure of the bones as revealed by X-rays, but whether or not the opacity of the bands is due to deposited lead salts.

Microscopical examination of bone by the above method not only shows an abundant deposition in the cancellous tissue but also a

marked lead deposit in the compact tissue, while the only evidence of an extra deposit in the epiphysis is a line just below the articular cartilage. This line has proved to be only a few microns thick in every animal examined and it is doubtful whether an X-ray photograph would be sufficient to reveal this in the presence of so much calcium.

TABLE 2.—*Effect of SO_2–decalcification upon the lead content of bones*

[Lead content (mg. Pb/10 g. bone)]

Number	Bone	Calcified portion	Decalcified portion
1	Humerus	1.05	1.10
2	Humerus	1.12	.92
3	Femur	1 05	1.16

X-ray photography of bones of dogs which had received large doses of lead carbonate over a period of months failed to reveal opaque areas which have heretofore been indicated as characteristic of lead poisoning. In the case of one dog, each of three bones was cut lengthwise, one-half decalcified, and both calcified and decalcified bones X-rayed together (fig. 6). Subsequent analysis showed that lead was present in both the calcified and decalcified bone to the same extent (table 2). Since the lead was not removed from the bone by decalcification and since the decalcified bone is very transparent to X-rays, the conditions were optimal for revealing the lead. It is apparent that the small amounts of lead deposited in bone are insufficient to register by means of X-rays and that darkened areas which have heretofore been accepted as lead deposits are likely to be due to calcium. From what is now known concerning the distribution of lead in bone, it would be surprising indeed if such small amounts of lead so evenly distributed would be revealed by X-rays in the presence of such large amounts of calcium. The lead content of human bones with known exposure to lead is also insufficient in amount to impart any marked opacity to X-rays. In seven cases of lead poisoning reported in man (*13*), the lead content of the bones was found to range from 0.22 mg./10 g. of bone to 1.5 mg./10 g. of bone. Tompsett and Anderson (*14*) found the lead content of bones in two cases of occupational exposure to lead to vary from 0.085 to 1.194 mg.Pb/10 g. of bone. Even in animals subjected to severe lead poisoning the largest amount of lead in the bone tissue of rats in the present study was 15 mg./10 g. of bone.

Further study was made of thin sections of compact bone tissue which had been partly submerged in a saturated solution of lead chloride for 24 hours, then washed and X-rayed. The lead deposit was converted to sulfide for photography (fig. 7) and the sections were then ashed and analyzed. The lead content of the sections

were as shown in table 3. It will be seen from the above that although a substantial amount of lead is present asymmetrically distributed, no indication of its presence is indicated in the X-ray photographs.

TABLE 3.—*Lead content of X-rayed bone*

Number	Thickness of section (mm.)	Weight (grams)	Lead content (mg. Pb/10 g. bone)
1	1.14	1.55	12.7
2	.92	.97	5.5

Deposition of lead in the red marrow, particularly within the fat cells, was found to occur in all cases of extensive lead absorption. In the earlier stage of lead absorption a noncrystalline deposit occurs about the periphery of the fat cells, while in the later stage a crystalline aggregation is to be noted in the fat cells, occasionally completely filling a cell. Figures 8, 9, and 10 show, respectively, normal marrow, marrow with a beginning deposition of lead about the border of the fat cells following the ingestion of lead for 2 weeks, and finally marrow of a dog fed large amounts of lead for 8 months. Chemical analysis and microscopical observation show yellow marrow to be practically free from lead in lead-poisoned animals but the evidence of an accumulation of lead in the fat cells of the red marrow is of particular interest with respect to the anemia found in lead poisoning. The reason for the presence of lead in the fat cells of the red marrow is somewhat obscure although deposition of the lead in bone in general occurs at precisely those points where the blood supply is rich. Whether the phosphate ion concentration is greater at the fat cell interface, whether phosphatase is more abundant at this point, or whether deposition in the cell is accidental requires experimental verification. Apparently deposition begins in the fat cells even before lead is appreciably deposited in the cancellous tissue.

A sequence of deposition is noted if one studies the cancellous or compact bone of animals in different stages of lead absorption. A study of this sequence of lead deposition by both the chromate crystal method and staining method indicates that, in the early stages, lead is simply diffused through the tissue in colloidal form as indicated by a brownish staining with the sulfide technique. Later on there is a distinct segregation of the lead into crystalline masses localized in clumps around the Haversian and Volkmann canals, in the compact tissue, in the fat cells of the red marrow, and throughout the cancellous tissue. The microscopic evidence would therefore appear to indicate that lead is deposited in bone in two stages: (*a*) initially, as colloidal lead diffused through the tissue substance, possibly as an adsorption phase, and (*b*) finally, as lead absorption continues, as segregated, definite crystalline masses.

SUMMARY

A method of positively identifying lead in bone tissue has been evolved which permits detailed investigation of the lead deposit. It has been shown that while the epiphyseal portion of bone is rich in lead, particularly in the early stage of lead absorption, deposition occurs throughout the compact tissue on all surfaces over which blood passes. X-ray studies of the bones of lead-poisoned animals indicate that the amount of lead, whether segregated or diffused, even in the absence of calcium, is insufficient to be revealed by ordinary X-ray photography. Deposition of lead was shown to occur in the fat cells of the red marrow.

Lead storage in bone tissue occurs first as colloidally dispersed and finally as segregated crystalline masses.

REFERENCES

(*1*) Minot, A. S.: The distribution of lead in the organism after absorption by the gastro-intestinal tract. J. Ind. Hyg., **6**: 125–148 (1924).
(*2*) Gusserow, A.: Untersuchung über Bleivergiftung. Arch. path. Anat. u. Phys., **21–22**: 443 (1861).
(*3*) Fairhall, L. T., and Miller, J. W.: A study of the relative toxicity of the molecular components of lead arsenate. Pub. Health Rep., **56**: 1610–1625 (1941).
(*4*) Fairhall, L. T., and Neal, P. A.: The absorption and excretion of lead arsenate in man. Pub. Health Rep., **53**: 1231–1245 (1938).
(*5*) Fairhall, L. T., and Miller, J. W.: The deposition and removal of lead in the soft tissues. Pub. Health Rep., **56**: 1641–1650 (1941).
(*6*) Minot, A. S., and Aub, J. C.: The distribution of lead in the human organism. J. Ind. Hyg., **6**: 149–158 (1924).
(*7*) Behrens, B., and Baumann, A.: Zur Pharmakologie des Bleis. Zeitschr. f. d. gesamte expertl. Med., **92**: 251–264 (1933).
(*8*) Timm, F.: Zur Histochemie einiger Schwermetalle, inbesondere des Bleis. Münch. Med. Wochenschr., **87**: 414 (1940).
(*9*) Sieber, E.: Histochemischer Bleinachweis im Knochen. Arch. f. exper. Path. u. Pharmakol.,**181**: 273–280 (1936).
(*10*) Fairhall, L. T., Sayers, R. R., and Miller, J. W.: The relative toxicity of lead and some of its common compounds. Pub. Health Bull. No. 253, Government Printing Office, 1940.
(*11*) Barth, E.: Untersuchungen über den Bleigehalt der menschlichen Knochen. Virchow's Arch. f. path. Anat., **281**: 146–151 (1931).
(*12*) Vogt, E. C.: A Rontgen sign of plumbism. Am. J. Roentgenol. and Radium Therap., **24**: 550–553 (1930).
Kraft, E., and Kato, K.: Röntgenbefunde bei Bleivergiftungen im Kindesalter. Fortschr. a. d. Geb. d. Rontgenstrahlen, **46**: 249–256 (1932).
Vogt, E. C., and McKhann, C. F.: Lead poisoning in infants and children. Radiol., **22**: 87–92 (1934).
Childe, A. E.: The Rontgen ray diagnosis of lead poisoning in children. Intern. Clin., **1**: 192–195 (1934).
Horwitt, M. K., and Cowgill, G. R.: The effects of ingested lead on the organism: Studies on the rat. J. Pharm. and Expertl. Therap., **61**: 300–310 (1937).
Horwitt, M. K., and Cowgill, G. R.: Further investigations of the absorption of minute amounts of lead from the diet. Proc. Am. Soc. Biol. Chemists, 1938. J. Biol. Chem., **123**: lxi (1938).
(*13*) Aub, J. C., Fairhall, L. T., Minot, A. S., and Reznikoff, P.: Lead Poisoning. Williams and Wilkins, Baltimore, 1926.
(*14*) Tompsett, S. L., and Anderson, A. B.: The lead content of human tissues and excreta. Biochem. J., **29**: 1851–1864 (1935).

THE MICROCLIMATE OF DIURNAL RESTING PLACES OF *ANOPHELES QUADRIMACULATUS* SAY IN THE VICINITY OF REELFOOT LAKE[1]

By DON E. EYLES, *Associate Biologist*, and LINDSAY K. BISHOP, *Scientific Assistant*
United States Public Health Service

During the summer of 1941 reconnaissance of the land surrounding Reelfoot Lake, Tennessee, revealed many concentrations of *Anopheles quadrimaculatus* Say in barns or similar artificial shelters. As many as 10,000 mosquitoes (estimated number) were found in a single building. Nine shelters were selected for study.

The following report discusses the movements of mosquitoes out of these shelters at dusk and into them at dawn, especially in relation to the climatic conditions inside the shelters and in the open at the time these movements took place. Conditions that prevailed in the resting places during the daylight hours of rest are also considered.

There are three qualifications which a resting place must possess to be attractive to adult mosquitoes of any species. In the first place it must be within flight range of a breeding place of the mosquito; second, it must be close to a blood meal; third, it must have a microclimate which is preferred or at least tolerated by the mosquito.

Of the nine shelters selected for study, all met the first and second requirements (table 4). The third requirement, that the resting place must have a microclimate which is preferred or at least tolerated by the mosquito, has been investigated in connection with *A. maculipennis* (*2*) but no detailed study of these conditions in relation to *A quadrimaculatus* has been found in the literature. Only the suggestions that the imagos prefer places with "darkness, or a dim, diffused light; cool temperature; [high] humidity; and little if any movement of air" have been found (*1*).

As it has been suggested that each type of *Anopheles* may have a preferred type of microclimate, and as a change in type of structure might discourage large concentrations of mosquitoes in a given region, an intensive study of several resting places of *A. quadrimaculatus* was undertaken.

Measurements of temperatures, humidities, and light intensities have been recorded. An index of evaporation for comparing resting places is also presented.

This study was made during the months of August and September 1941. Facilities of the Reelfoot Lake Biological Station of the Tennessee Academy of Sciences were generously lent for the investigation.

[1] From the Division of Infectious Diseases, National Institute of Health.

MOVEMENTS AT DUSK

Method of study.—Hygrothermographs were placed in each resting place the night before observations were to be madę and were removed at the same hour the following night. A hygrothermograph was also maintained nearby in a standard weather instrument shelter during

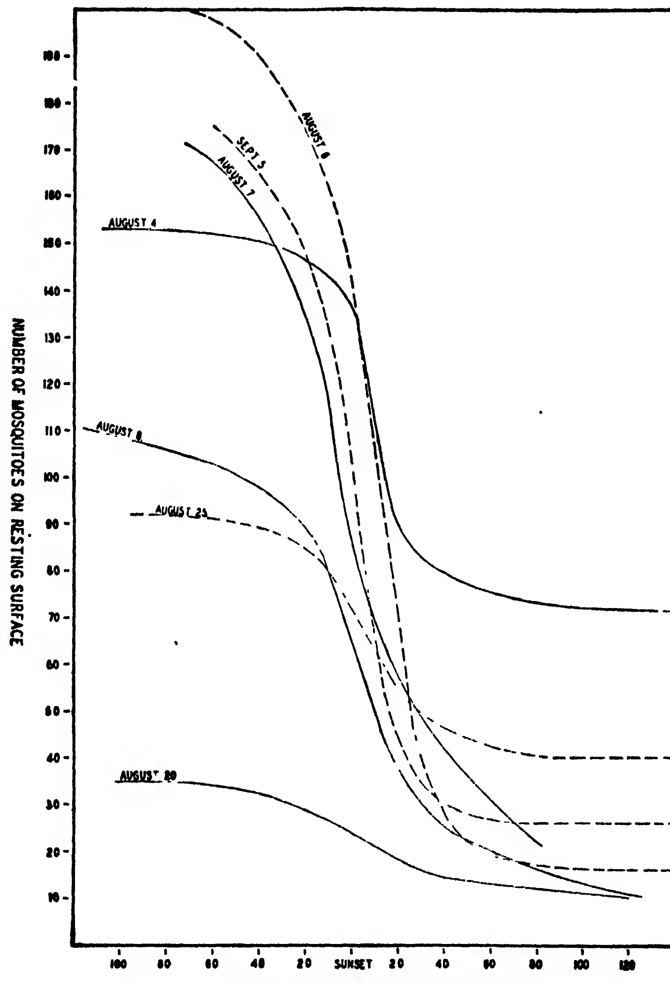


FIGURE 1.—Smoothed curves representing the evening exodus of *Anopheles quadrimaculatus* from the diurnal resting place.

all the experiments. The mosquitoes[2] on selected surfaces in the structures to be studied were counted, with the aid of a flashlight, at 10- to 30-minute intervals for about 2 hours before and 2 hours after sunset. Often an additional count was made later in the evening.

[2] In the following paragraphs "mosquitoes" refers to the females of *Anopheles quadrimaculatus* in all cases.

Table 1.—*The number of mosquitoes of an original 100 which leave the resting surface during various 10-minute periods before and after sunset, compared with mean microclimatic conditions* [1]

	Minutes before and after sunset																
	80-70	70-60	60-50	50-40	40-30	30-20	20-10	10-S.	S -10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Shelter 1, Aug. 4	0.4	0.6	1.2	1.5	1.6	2.2	4.9	7.4	16.1	42.0	8.5	4.9	3.1	2.2	1.2	0.8	0.6
Shelter 2, Aug. 6	.5	.7	1.6	2.4	3.8	5.4	7.3	8.2	19.0	20.6	18.5	5.4	3.5	1.4	.7	.4	.3
Shelter 2, Aug. 7	-----	2.6	3.3	4.0	5.1	8.0	11.9	20.8	10.6	7.6	6.3	4.6	4.0	3.3	3.0	2.3	-----
Shelter 2, Aug. 8	1.5	1.8	2.3	2.8	4.0	5.5	9.0	12.0	18.0	12.5	7.0	5.0	3.5	2.5	2.5	2.0	1.5
Shelter 2, Aug. 20	1.0	2.0	2.0	4.0	6.0	8.0	10.0	12.0	12.0	12.0	8.0	6.0	4.0	3.0	2.0	2.0	2.0
Shelter 1, Aug. 25	1.0	1.0	1.4	1.4	2.4	5.8	7.9	14.4	17.3	18.3	8.8	5.8	4.8	3.8	1.9	1.3	.5
Shelter 2, Sept. 5	2.2	2.2	2.9	3.8	4.2	5.4	7.7	20.0	30.1	9.6	5.1	3.2	1.6	.6	.3	.2	-----
Mean ratio	-----	1.6	2.1	2.8	3.9	5.8	8.4	13.5	17.6	17.5	8.9	5.0	3.5	2.4	1.7	1.3	-----
Mean temperature in resting place	83.0	-----	82.6	-----	82.2	-----	81.4	-----	80.6	-----	79.3	-----	78.1	-----	77.3	-----	76.4
Mean temperature in instrument shelter	81.5	-----	79.9	-----	77.9	-----	76.1	-----	74.3	-----	72.9	-----	72.4	-----	71.9	-----	71.3
Mean humidity in resting place	57.6	-----	60.4	-----	62.3	-----	65.9	-----	66.9	-----	68.0	-----	69.7	-----	70.7	-----	73.1
Mean humidity in instrument shelter	91.9	-----	96.1	-----	98.4	-----	99.4	-----	100.0	-----	100.0	-----	100.0	-----	100.0	-----	100.0
Mean evaporation in resting place	12.6	-----	11.7	-----	10.6	-----	9.8	-----	9.4	-----	8.7	-----	7.9	-----	7.3	-----	6.5
Mean evaporation in instrument shelter	2.5	-----	1.0	-----	.4	-----	.2	-----	0	-----	0	-----	0	-----	0	-----	0
Mean outside light intensity	-----	1,430	1,040	740	500	360	260	130	48	9	2	0	-----	-----	-----	-----	-----

[1] Temperatures are in degrees Fahrenheit, humidities in percentage saturation, evaporation as vapor pressure deficit, and light intensity in foot candles.

Also, at the same interval of time, readings of light intensity in the open were made with an illumination meter. Owing to the fact that the meter could not be used below intensities of 1 to 2 foot candles, it was impossible to make the light intensity readings inside the structures during the dusk hours, and subsequently during the hours of dawn.

Temperature and humidity readings from the instrument shelter are referred to as temperatures and humidities in the open. The function of the shelter is to prevent the transformation of radiant energy from the sun from being reflected in the readings of the weather instruments. During the period of the experiment air movements were at a minimum.

Discussion.—The procedure outlined was carried out on seven occasions at two shelters. The first shelter was located in a treeless pasture and had a loft almost completely closed off from that part of the barn in which the greatest number of mosquitoes rested. The second shelter was almost surrounded by trees and had an open loft.

Figure 1 shows on smoothed curves the changes in density of mosquitoes on the selected surfaces; table 1 gives the percentage of the original number which left during any 10-minute period, as well as the mean microclimatic conditions.

It can be seen from figure 1 and table 1 that egress of mosquitoes was greatest during the 20 minutes following sunset. This was true in six of the seven experiments; only on one dark, rainy evening was the response different. On this occasion the greatest number left between 20 minutes before and 10 minutes after sunset. Behavior was similar in both shelters studied.

Table 2 gives data at 10- or 20-minute intervals concerning temperature, relative humidity, evaporation, and light intensity (light intensity in the open only), in the resting place and in the open. Means are to be found at the foot of table 1. These data, except for light intensity, are derived from the respective hygrothermographic records, evaporation indices being calculated in the manner outlined in the last section of this paper.

During the period of greatest activity at dusk, temperatures in the open were on the decline after reaching their maximum 3 to 4 hours before sunset. Outside humidities had been rising over a similar period. The decline and rise, respectively, of temperature and humidity within the resting place lagged about an hour or two behind that in the open. Evaporation rates began their decline at the same time the other climatic conditions changed their trends, but by the time the mosquitoes began their evening movement evaporation in the open had ceased, while in the resting place the rate had not greatly fallen. Indeed, during the few hours preceding sundown evaporation

indices (assuming still conditions) in the open were less than the rates in the shelter. Light intensities in the open declined from several thousand foot candles at noon to a mean of 48 foot candles at sunset, and at about 30 to 40 minutes after sundown no light could be measured with the meter used. It is very likely that intensities inside the shelter were proportional to those in the open.

A study of the data in table 2 indicates that of all the factors measured only light intensity in the open can be consistently correlated with the evening mosquito activity. Only this factor was undergoing marked change at the time of the initiation of the evening exodus, and it is the only factor immune to very considerable variation during precipitation. It was observed by the investigators that adults of *A. quadrimaculatus* do not leave their diurnal resting place during the temperature and evaporation decline and humidity increase which accompanies rain; the effect of rain is often greater on these factors than the effect of the coming of night. Significantly, light intensity at sunset on the night of early egress was 2 foot candles.

In order to determine whether decline in intensity of light is the stimulus initiating the evening movement out of the resting place, an experiment was designed in which a light was placed in one portion of shelter 2, several hours before sunset, so as to throw about 6 foot candles of light on the counting surface. The shelter was divided into two parts by an improvised partition in such a manner that half could be kept dark and used as a control. Counts were made in both halves as in the previous experiments, but were continued until later in the evening. Figure 2 shows the smoothed curves of the changes in density of mosquitoes on the lighted and unlighted surfaces for two such experiments. In the first experiment the screen between the lighted surface and the unlighted was much less efficient than in the second. At no time were mosquitoes attracted to the 60-watt Mazda lamp, which was powered by a portable generator.

The results of these experiments bear out the conclusion that light intensity decline was the chief stimulus initiating the evening movement. In the first experiment the mosquitoes on the lighted surface at no time showed an abrupt change in density (although a gradual decline was noted); the mosquitoes on the control surface left at the usual time. In the second experiment only about one-fifth of the mosquitoes on the lighted surface had left before 2 hours after sunset. At 9:05 p. m. the light was extinguished and in the ensuing 25 minutes density dropped by over three-fifths (fig. 2). It may be that the gradual decline noted in both experiments was due to unknown factors, but the writers believe that it was principally due to the unpreventable disturbance attending the counting operation.

Table 2.—*Microclimatic conditions within and outside of diurnal resting place at time of evening exodus of* Anopheles quadrimaculatus [1]

	Minutes before and after sunset (S.)																				
	100	90	80	70	60	50	40	30	20	10	S.	10	20	30	40	50	60	70	80	90	100
Shelter 1, Aug. 4:																					
Shelter temperature	80	......	79.5	......	79	......	78	......	76.5	......	75.5	......	74	......	73	......	72	......	71.5	......	71
Outside temperature	82	......	80	......	78	......	76	......	74	......	72	......	71	......	70	......	69	......	68.5	......	68
Shelter humidity	43	......	47	......	52	......	55	......	56	......	57	......	60	......	62	......	64	......	66	......	68
Outside humidity	81	......	85	......	89	......	93	......	96	......	100	......	100	......	100	......	100	......	100	......	100
Shelter evaporation	14.7	......	13.1	......	12.2	......	11.0	......	10.5	......	10.0	......	8.7	......	8.1	......	7.5	......	6.8	......	6.2
Outside evaporation	5.4	......	4.0	......	3.0	......	1.8	......	1.5	......	0	......	0	......	0	......	0	......	0	......	0
Outside light intensity	......	......	......	800	600	500	400	275	209	120	50	13	4	0	0	0	0	0	0	0	0
Shelter 2, Aug. 6:																					
Shelter temperature	88	......	88	......	87.5	......	87	......	86	......	85.5	......	84.5	......	83.5	......	83	......	82	......	81.5
Outside temperature	85	......	83.5	......	82	......	80	......	78.5	......	77	......	76	......	75.5	......	75	......	74.5	......	74
Shelter humidity	54	......	52	......	57	......	63	......	65	......	67	......	69	......	70	......	70	......	72	......	72
Outside humidity	94	......	97	......	100	......	100	......	100	......	100	......	100	......	100	......	100	......	100	......	100
Shelter evaporation	15.9	......	16.6	......	14.4	......	12.3	......	11.4	......	10.8	......	9.9	......	9.1	......	8.7	......	8.3	......	7.9
Outside evaporation	1.5	......	1.4	......	0	......	0	......	0	......	0	......	0	......	0	......	0	......	0	......	0
Outside light intensity	......	......	1,925	1,500	1,125	800	550	360	250	150	50	17	3	0	0	0	0	0	0	0	0
Shelter 2, Aug. 7:																					
Shelter temperature	88.5	......	88	......	87.5	......	87	......	86.5	......	86	......	83.5	......	81	......	80	......	78.5	......	77
Outside temperature	87	......	86	......	85	......	81	......	77	......	74	......	71	......	72	......	72	......	72	......	72
Shelter humidity	54	......	50	......	52	......	59	......	64	......	60	......	62	......	67	......	68	......	72	......	77
Outside humidity	84	......	92	......	100	......	100	......	100	......	100	......	100	......	100	......	100	......	100	......	100
Shelter evaporation	16.0	......	17.2	......	16.1	......	13.4	......	11.7	......	12.9	......	11.7	......	9.3	......	8.6	......	6.9	......	5.8
Outside evaporation	5.5	......	2.9	......	0	......	0	......	0	......	0	......	0	......	0	......	0	......	0	......	0
Outside light intensity	......	......	......	2,250	1,575	950	500	230	124	4	0	0	0	0	0	0	0	0	0	0	0
Shelter 2, Aug. 8:																					
Shelter temperature	86.5	......	86.5	......	86.5	......	86	......	85.5	......	85	......	84	......	82.5	......	81.5	......	80.5	......	80
Outside temperature	85.5	......	84	......	82	......	80.5	......	78.5	......	77	......	76	......	75.5	......	75	......	74.5	......	74
Shelter humidity	56	......	59	......	60	......	61	......	62	......	64	......	65	......	66	......	67	......	68	......	68
Outside humidity	86	......	94	......	100	......	100	......	100	......	100	......	100	......	100	......	100	......	100	......	100
Shelter evaporation	14.2	......	13.2	......	12.9	......	12.6	......	12.3	......	11.2	......	10.8	......	10.1	......	9.3	......	8.8	......	8.6
Outside evaporation	5.0	......	2.1	......	0	......	0	......	0	......	0	......	0	......	0	......	0	......	0	......	0
Outside light intensity	......	2,650	2,350	1,900	1,000	525	400	275	180	100	44	11	2	0	0	0	0	0	0	0	0
Shelter 2, Aug. 20:																					
Shelter temperature	74	......	73.5	......	73	......	72.5	......	71.5	......	70.5	......	69	......	67.5	......	67	......	66	......	65.5
Outside temperature	75	......	73	......	71	......	69	......	67.5	......	66	......	64.5	......	64	......	63	......	62	......	61
Shelter humidity	64	......	66	......	73	......	76	......	78	......	78	......	76	......	77	......	77	......	80	......	82
Outside humidity	94	......	94	......	96	......	100	......	100	......	100	......	100	......	100	......	100	......	100	......	100
Shelter evaporation	7.4	......	7.3	......	5.9	......	4.9	......	4.5	......	4.3	......	4.4	......	4.2	......	3.9	......	3.5	......	3.0
Outside evaporation	1.6	......	1.5	......	.9	......	0	......	0	......	0	......	0	......	0	......	0	......	0	......	0
Outside light intensity	......	2,250	1,800	1,650	1,300	900	550	450	300	180	44	10	2	0	0	0	0	0	0	0	0
Shelter 1, Aug. 25:																					
Shelter temperature	82.5	......	82.5	......	82	......	82	......	81.5	......	81	......	80	......	79.5	......	79	......	78.5	......	77.5
Outside temperature	85	......	84	......	83	......	82	......	81	......	79.5	......	78.5	......	77.5	......	77	......	76.5	......	76
Shelter humidity	74	......	79	......	81	......	83	......	84	......	87	......	86	......	90	......	90	......	91	......	93

Outside humidity	90	......	93	......	97	......	100	......	100	......	100	......	100	......	100	......	100	......	100	......	100
Shelter evaporation	7.8	......	6.3	......	5.7	......	5.2	......	4.6	......	4.1	......	3.8	......	2.8	......	2.9	......	2.1	......	1.6
Outside evaporation	3.8	......	2.4	......	.9	......	0	......	0	......	0	......	0	......	0	......	0	......	0	......	0
Outside light intensity	......	1,900	1,100	1,050	875	700	475	350	300	100	24	4	1	0	0	0	0	0	0	0	0
Shelter 2, Sept. 5:																					
Shelter temperature	83	......	83	......	83	......	83	......	82	......	81	......	80	......	79.5	......	78.5	......	77.5	......	77
Outside temperature	82	......	80	......	78.5	......	77	......	76	......	74.5	......	73.5	......	72.5	......	72	......	71	......	70
Shelter humidity	50	......	50	......	48	......	49	......	52	......	55	......	57	......	56	......	59	......	68	......	64
Outside humidity	83	......	88	......	91	......	96	......	100	......	100	......	100	......	100	......	100	......	100	......	100
Shelter evaporation	14.4	......	14.4	......	14.9	......	14.7	......	13.5	......	12.6	......	11.5	......	11.4	......	10.2	......	8.9	......	8.8
Outside evaporation	5.3	......	3.5	......	2.2	......	1.3	......	0	......	0	......	0	......	0	......	0	......	0	......	0
Outside light intensity	......	......	1,095	880	800	785	640	560	485	250	122	6	2	0	0	0	0	0	0	0	0

[1] Temperatures are in degrees Fahrenheit, humidities in percentage saturation, evaporation as vapor pressure deficit (in millimeters of mercury), and light intensity in foot candles in the open.

MOVEMENTS AT DAWN

Method of study.—Hygrothermographs were manipulated as in the dusk experiments, and selected surfaces were counted similarly once or twice before dawn and subsequently at 10- to 30-minute intervals. As before, light intensity readings in the open were taken at the same interval. The same two structures used in the dusk studies were employed, and counts were made on five occasions.

Discussion.—On August 5 and August 22 the greatest inward movement of mosquitoes into shelter 1 was during the 30 minutes just

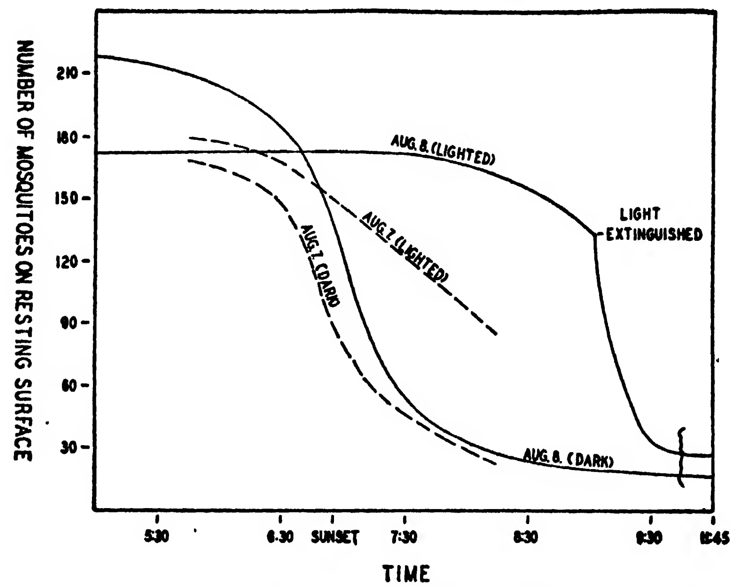


FIGURE 2.—Smoothed curves illustrating the effect of light on the dusk movement of *Anopheles quadrimaculatus.*

before and just after sunrise. (See fig. 3 which shows on smoothed curves the changes in density of mosquitoes on the selected surfaces.) In both cases there was very little temperature variation and relative humidities were still rising in the resting shelter, this rise being a continuation of the previous evening's rise. In the open, humidity was stable at saturation and temperatures were just beginning their morning rise (table 3). Evaporation was, therefore, greater in the resting place than in the open at the time of entry. On September 2 little movement of mosquitoes into shelter 1 was noted.

On August 6 in shelter 2 the number of mosquitoes on the selected surfaces (on this occasion two surfaces, *a* and *b* of fig. 3, were used) was observed to increase until late in the morning. This slow increase suggested to the investigators that mosquitoes might first enter the eaves and then be driven down by light entering the loft of the barn.

Subsequently, on August 18, counts were made in this same shelter both in the eaves and on one of the wall surfaces studied on August 6. Results of this experiment were inconclusive; mosquitoes continued to appear both in the eaves and below until late in the morning.

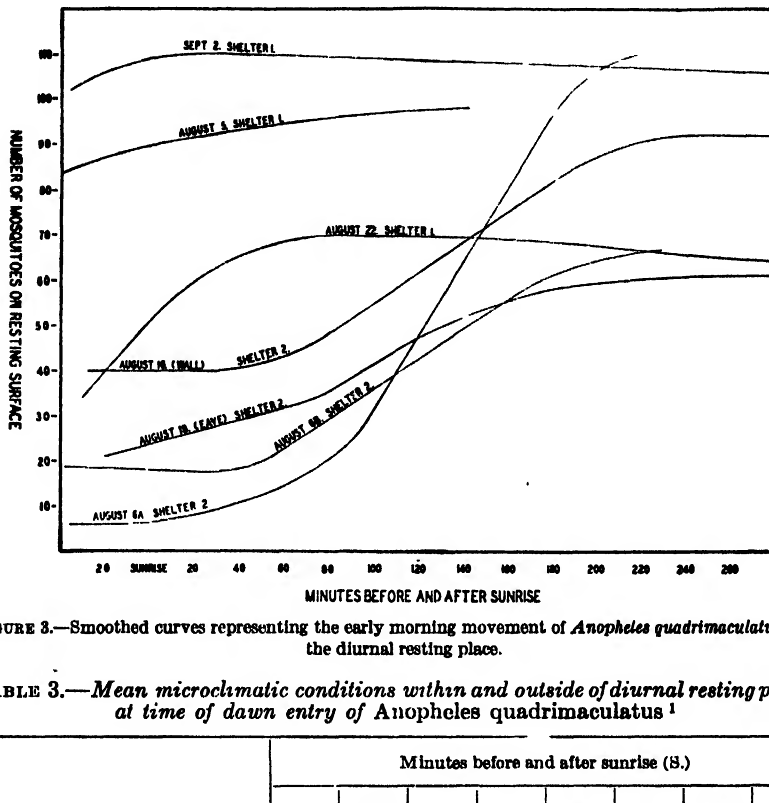


FIGURE 3.—Smoothed curves representing the early morning movement of *Anopheles quadrimaculatus* into the diurnal resting place.

TABLE 3.—*Mean microclimatic conditions within and outside of diurnal resting places at time of dawn entry of* Anopheles quadrimaculatus [1]

	Minutes before and after sunrise (S.)							
	40	20	S.	20	40	60	80	100
Shelter 1:								
Temperature	68	68	67.5	67.5	67.5	68	68	68.5
Humidity	91	92	92	95	96	97	96	96
Evaporation	1.7	1.4	1.4	1.0	.9	.7	.8	.8
Shelter 2:								
Temperature	69	69.5	69	68.5	69	69.5	70 5	71.5
Humidity	92	92	93	93	94	98	99	96
Evaporation	1.8	1.7	1.5	1.3	1.2	.6	.3	1.3
Outside:								
Temperature	65.5	65.5	65.5	66	66.5	67.5	69	71
Humidity	100	100	100	100	100	100	95	89
Evaporation	0	0	0	0	0	0	1 0	2.3
Light intensity	0	25	110	400	720	1,100	1,800	2,200

[1] Temperatures are in degrees Fahrenheit, humidities in percentage saturation, evaporation in vapor pressure deficit (in millimeters of mercury), and light intensity in foot candles in the open.

In the case of the second resting place, temperatures in the shelter were rising and humidities falling during the period of mosquito entry. However, this rise and fall was not nearly so decided as the coincident rise and fall in the instrument shelter (table 3). On the other hand,

the entrance of mosquitoes started before humidity fell below saturation outside and before outside temperatures had risen to any great degree. Evaporation, at the time of the initiation of the inward movement, was greater in the shelter than on the outside, but the inward movement was still going on when this situation was reversed.

More careful observations must be made before generalizations concerning the morning movements of mosquitoes into daytime resting places can be made, but the observations above give some leads which might be followed up. It appears that the inward movement is a gradual one dependent upon when sunlight (this, of course, affects the other climatic conditions) strikes the individual mosquito. This was indicated by the presence of mosquitoes on the outer surfaces of the barns many minutes after sunup, since these mosquitoes appeared to move only when the sunlight swept the surfaces. In the evening the mosquitoes which left the resting places were subject to uniform conditions within the shelter, and, as has been shown, left at the same time. At dawn mosquitoes in the open were subject to a variety of conditions depending upon the position they occupied with respect to shadow, and the stimulus which initiated the inward movement was not likely to act on the entire population at the same time. It seems significant that in the case of the shelter which was located in the open the inward movement was earlier and less gradual than in the case of the shelter located in deep shadow, as is evidenced by the differences of the curves in figure 3.

DAYTIME MICROCLIMATIC CONDITIONS

Method of study.—The microclimates of nine structures used as resting places by *Anopheles quadrimaculatus* were measured. The visible characteristics of these shelters are summarized in table 4. Hygrothermographs were again employed simultaneously in the resting place and in the instrument shelter. In table 5 maximum, minimum, and mean temperatures are tabulated at 2-hour intervals from 8 a. m. to 4 p. m., as are the corresponding values of relative humidity. These readings correspond with the tabulated light intensities taken at the same hours both within and without the shelter. The light measurements within the shelter were made by placing the quartz disk of the illumination meter on three different places on the surface where mosquitoes were resting. Means of these groups of three readings in actual foot candles are given in table 5. The intensities in the open were taken by placing the quartz disk parallel to the ground in an unshaded area, and are recorded in hundreds of foot candles. The same method of taking readings in the open was followed in the first two sections of the study.

Not only relative humidities, which bear little relation to actual evaporation, but also indices of relative evaporation are given in

order that conditions in the shelters can be compared with conditions prevailing elsewhere. For this index the authors use vapor pressure deficit in millimeters of mercury, basing this on the assumption that the body temperature of a mosquito at rest is the same as that of the surrounding atmosphere. In the diurnal shelter this is probably true, as metabolic activity, which might affect body temperature, is at a minimum, and an insect as small as a mosquito could probably not appreciably lower its body temperature by evaporation without upsetting the physiological water balance. Relations shown between evaporation in the shelter and outside are valid only for still conditions for, other things being equal, evaporation is greater in the wind.

TABLE 4.—*External characteristics of artificial diurnal resting places of* Anopheles quadrimaculatus *studied around Reelfoot Lake*

Location	Maximum number mosquitoes noted (estimated)	Distance (feet) from good breeding place	Distance (feet) from good blood source	Visible characteristics
Shelter 1 Wollaston barn.	10,000	500	(1)	Barn, tin roof, closed loft, dirt floor, not shaded. Cows and swine at night.
Shelter 2 McQueen barn.	8,000	200	50	Barn, shingle roof, open loft, wooden floor, well shaded. No stock.
Shelter 3 Powell barn..	4,000	2,000	....	Barn, shingle roof, closed loft, dirt floor (mostly), not shaded. Cows
Shelter 4 Morton barn .	4,000	1,200	.. . ..	Barn, shingle roof, half-open loft, wooden floor (mostly), half shaded. Mules
Shelter 5. Biological station	400	1,000	200	Under part of frame building, concrete floor, whitewashed rafters, lattice-work sides.
Shelter 6 Hammer Scott barn.	3,000	500	....	Barn, shingle roof, loft open, dirt floor (mostly), unshaded. Cows.
Shelter 7. Miller barn..	4,000	1,200	....	Barn, shingle roof, open loft, dirt floor, shaded. Cows
Shelter 8. Spout Springs barn.	4,000	3,000	....	Barn, shingle roof, closed loft, dirt and wooden floor, unshaded. Cows.
Shelter 9. Bridge at Walnut Log.	200	500	400	Small wooden bridge with wide cracks, over intermittent brook.

[1] Stock in shelter at least at night.

Maximum, minimum, and mean values for evaporation are given in table 5.

The measurements of temperature, humidity, evaporation, and light intensity outlined above were made on 24 rainless days during a 38-day period spanning August and September.

Discussion.—Table 6 summarizes the difference between climatic conditions in the shelter and in the open; mean differences and the probable error of these means are given. Their differences are graphically shown in figure 4 where means of temperature, humidity, and evaporation from the resting place and the instrument shelter are plotted.

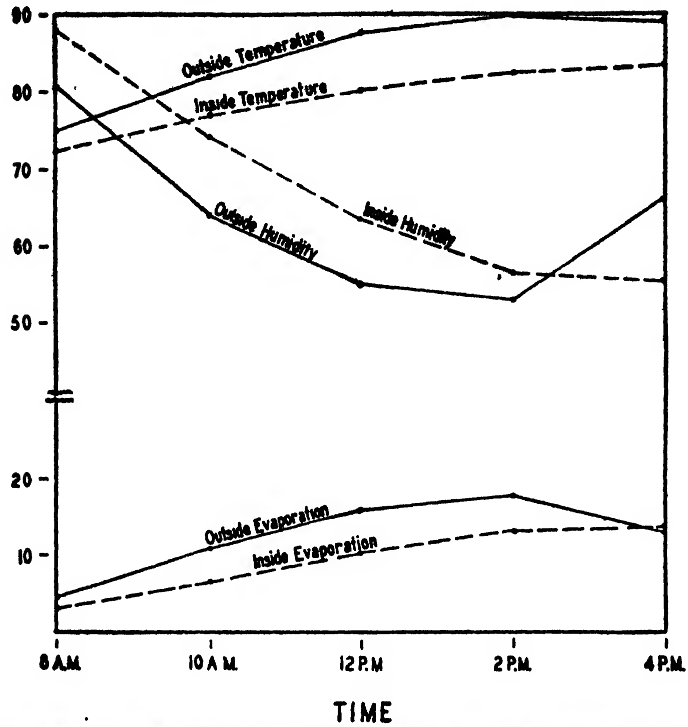


FIGURE 4.—Means of temperature, humidity, and evaporation inside the diurnal resting place and in the instrument shelter. Temperature is in degrees Fahrenheit, humidity is percentage of saturation, and evaporation is expressed as the vapor pressure deficit.

TABLE 5.—*Microclimatic conditions in instrument shelter and in resting places at 2-hour intervals*

	Instrument shelter						Resting place					
	8 a. m.	10 a. m.	12 noon	2 p. m.	4 p. m.	Mean	8 a. m.	10 a. m.	12 noon	2 p. m.	4 p. m.	Mean
Temperature, ° F.:												
Mean	75	82	87.5	90	89	84.5	72.5	77	80	82.5	83.5	79
Maximum	82	90	96	98	99	93	81	85	92	93	93	88
Minimum	66	70	71	79	78	73	64	64	66	69	71	67
Relative humidity:												
Mean	80.5	64	55	53	66	64	88	74.5	63.5	56.5	55.5	67.5
Maximum	100	87	72	72	100	83	100	93	87	76	78	84
Minimum	62	40	40	38	47	47	70	59	45	40	36	51
Evaporation:												
Mean	4.5	10.7	15.8	17.7	12.8	12.3	2.7	6.4	10.2	13.1	13.6	9.2
Maximum	8.3	19.2	23.6	26.6	24.1	18.4	6.6	11.1	20.8	20.7	20.0	14.7
Minimum	0	3.6	5.9	8.6	0	5.4	0	1.7	3.1	4.6	5.8	3.7
Light intensity: [1]												
Mean	47.1	100	125.5	121	49	88.5	1.8	2.8	3.1	3.4	2.6	2.8
Maximum	71	150	170	168	70	116	7	8	8	8	9	7
Minimum	6	12	44	70	20	51	0	1	0	0	0	0

[1] Outside intensities in hundreds of foot candles; inside intensities in actual foot candles.

TABLE 6.—*Means of differences between inside microclimatic conditions and outside conditions measured simultaneously*

	8 a. m.	10 a. m.	Noon	2 p. m.	4 p. m.	Mean
Temperature, ° F.:						
Mean	−2.21	−5.08	−7.25	−7.29	−5.67	−5.71
PE	±0.304	±0.325	±0.287	±0.318	±0.384	±0.230
Relative humidity:						
Mean	+7.17	+10.58	+8.92	+4.00	−10.50	+3.67
PE	±1.586	±0.952	±0.943	±0.957	±1.504	±0.950
Evaporation:						
Mean	−1.75	−4.31	−5.59	−4.63	+0.84	−3.10
PE	±0.287	±0.370	±0.299	±0.357	±0.583	±0.295

PE = Probable error.
− or + signs signify that measurements in the shelter were less or greater, respectively, than the same measurements outside.

It can be seen that during the early and late daylight hours the conditions outside and inside the diurnal resting place are most nearly similar. During the hot portion of the day temperatures and evaporation rates are more moderate inside the shelter—a condition which evidently makes the shelters suitable for *Anopheles quadrimaculatus*. Relative humidity is inversely higher.

Evaporation rates are definitely lower in the resting places than in the instrument shelter although the difference amounts to only about 20 or 30 percent. A consideration of the evaporation rate which would hold if the mosquito were struck by direct sunlight, however, shows what a great protective effect the diurnal shelter affords. The temperature of *A. quadrimaculatus* adults subjected to the radiant energy of the sun was not measured, but basing an estimate on work on other insects, it seems likely that a temperature of from 40 to 42 degrees centigrade might be reached (Wigglesworth (*3*), pages 359–360). Under such conditions the mean noon evaporation rate in the shelter would be only a small fraction of the rate in the open. It should be emphasized, too, that the above comparisons are based on still conditions. The daytime shelter affords protection from wind, which would have the effect of further increasing the outside evaporation rates.

No attempt was made to measure the variation of conditions within the shelters, but instruments were in each case placed in that part of the shelter favored by mosquitoes.

SUMMARY AND CONCLUSIONS

1. The evening egress of mosquitoes from the diurnal resting places occurs most rapidly in the 20 minutes after sunset. The only microclimatic condition which could be correlated with this egress was the covariant light intensity; at the time of most rapid exodus, light intensities in the open varied from a mean of about 48 foot candles at sunset to 2 foot candles 20 minutes later.

2. An experiment on the effect of artificial light on mosquitoes in the daytime resting places supported the conclusion that light intensity is the principal factor initiating the evening movement from the shelter to the open. It was found that a large portion of the mosquitoes could be made to remain through the evening in a lighted diurnal shelter.

3. During the hours just after sunrise *Anopheles quadrimaculatus* females tend to enter the diurnal resting place, but this inward movement is gradual, not concerted, and seems to depend upon when direct sunlight strikes the mosquitoes in the open.

4. During the daylight hours temperatures and humidities within the diurnal resting places of *A. quadrimaculatus* were found to be lower and higher, respectively, than outside conditions measured simultaneously. During the most severe part of the day temperatures were on the average 7° F. lower and humidities 8 percent higher than the outside measurements. Evaporation within the resting place was found to be only about two-thirds the outside rate.

5. Evaporation rates inside the diurnal resting places would only be a small percentage of the rate which would hold if a mosquito were exposed to the direct light of the sun and the direct action of the wind.

REFERENCES

(*1*) Boyd, Mark F.: An Introduction to Malariology. Harvard Univ. Press, Cambridge, 1930.

(*2*) Shannon, R. C.: Malaria studies in Greece: The reaction of anopheline mosquitoes to certain microclimatic factors. Am. J. Trop. Med., 15: 67–81 (1935).

(*3*) Wigglesworth, V. B.: The Principles of Insect Physiology Methuen, London, 1939.

ROCKY MOUNTAIN SPOTTED FEVER: DURATION OF POTENCY OF TICK-TISSUE VACCINE [1]

By R. R. PARKER, *Director, Rocky Mountain Laboratory*, and EDWARD A. STEINHAUS, *Associate Bacteriologist, United States Public Health Service*

Three lots of Rocky Mountain spotted fever vaccine of the Spencer-Parker type,[2] one manufactured in 1928 and two in 1929, were retested for potency on March 9, 1942. Their respective protective values appeared to be undiminished. In the interim they had been stored at a temperature range of from 34° to 40° F.

The only previous tests of duration of potency were reported by Spencer and Parker[3] in 1930. The results of these earlier tests suggested "that some batches of vaccine will retain full potency for more than a year when kept in the ice box."

[1] From the Rocky Mountain Laboratory (Hamilton, Mont.), Division of Infectious Diseases, National Institute of Health.

[2] Prepared from the infected tissues of the Rocky Mountain wood tick, *Dermacentor andersoni*.

[3] Spencer, R. R., and Parker, R. R.: Studies on Rocky Mountain spotted fever: Improved method of manufacture of the vaccine and a study of its properties. Hygienic Laboratory Bulletin 154, pp. 63-72, 1930.

The method of testing of potency in 1942 was identical with that used for the original tests. Each lot of vaccine was tested by injecting each of 6 male guinea pigs subcutaneously with 1 cc. Twelve days later each test animal and each of 4 control animals received intraperitoneally 1 cc. of citrated heart blood taken on the third day of fever from a guinea pig ill with a highly virulent western Montana strain of Rocky Mountain spotted fever (the average cc. contains 500 infectious doses). The vaccine is considered usable if a minimum of 4 of the 6 test animals are completely protected and the control guinea pigs have typical temperature curves and characteristic scrotal lesions. This criterion of potency is purely arbitrary, but has proved satisfactory in testing nearly 10,000 lots of vaccine prepared during the past 16 years. Records of the control guinea pigs used in 1928 and 1930 are not available, but they were obviously satisfactory since the 3 lots were released for administration.

Vaccine 347.—Prepared May 1, 1928. First potency test May 2, 1928: five guinea pigs completely protected; one had fever lasting 3 days. Potency retest March 9, 1942, approximately 14 years after manufacture: five guinea pigs completely protected; one had fever lasting one day.

Vaccine 467.—Prepared December 12, 1929. First potency test February 14, 1930: four guinea pigs completely protected; one valueless because of pneumonia; one lost during test. Potency retest March 9, 1942, approximately 12 years after manufacture: four guinea pigs completely protected; two guinea pigs had fever which lasted 2 days.

Vaccine 470.—Prepared December 31, 1929. First potency test January 10, 1930: two guinea pigs were completely protected; two had fever lasting 1 day (for one this fever was obviously not due to Rocky Mountain spotted fever), one had fever lasting 2 days, and one had fever lasting 5 days. Potency retest March 9, 1942, approximately 12 years later: six guinea pigs completely protected.

Virus controls.—Of the four guinea pigs used as controls on the virus employed for immunity tests of March 9, 1942, all had characteristic temperature curves and scrotal lesions; two died of spotted fever.

It is perhaps of interest that for a number of years the return of unused vaccine has been requested each fall. (Vaccine is dispensed for the most part during the first 6 months of the calendar year.) This returned vaccine consists of remnants of numerous lots (from a few to several hundred cc.), some prepared the same year as issued, others 1 and 2 years old. Much of it has been kept for months at room temperature. These remnants have been pooled in lots of 1,000 to 3,000 cc. and retested for potency and sterility, and reissued if satisfactory for use. Only rarely has a pooled lot failed to meet the potency requirements.

CONCLUSION

Individual lots of Rocky Mountain spotted fever vaccine prepared from the tissues of infected *Dermacentor andersoni* may retain their protective value for at least as long as 12 to 14 years.

DISABLING MORBIDITY AMONG INDUSTRIAL WORKERS, THIRD QUARTER OF 1942, WITH A NOTE ON THE OCCURRENCE OF THE RESPIRATORY DISEASES, 1933–42[1]

By W. M. Gafafer, *Senior Statistician, United States Public Health Service*

The data on the frequency of sickness and nonindustrial injuries causing disability for 8 consecutive calendar days or longer during the third quarter and the first 9 months of 1941 and 1942, presented

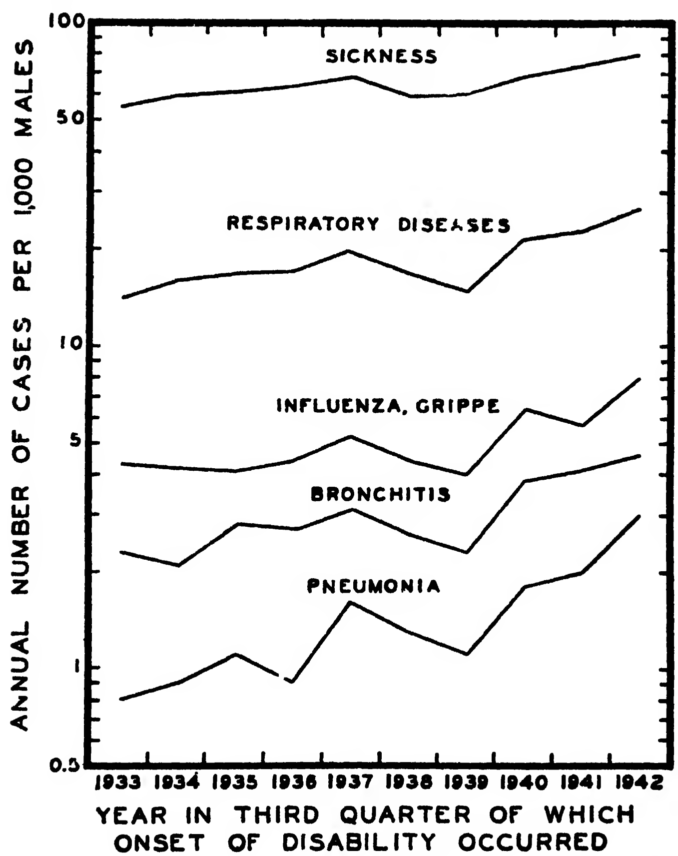


FIGURE 1.—Frequency of disabling cases of respiratory diseases lasting 8 consecutive calendar days or longer among MALE employees in various industries, the third quarters of 1933–42, inclusive (Vertical logarithmic scale)

[1] From the Division of Industrial Hygiene, National Institute of Health. For the second quarter of 1942 see PUBLIC HEALTH REPORTS, 57: 1620–1622 (1942)

Table 1.—*Frequency of disabling cases of sickness and nonindustrial injuries lasting 8 consecutive calendar days or longer among* MALE *employees in various industries, by cause, the third quarter of 1942 compared with the third quarter of 1941, and the first 9 months of 1942 compared with the first 9 months of the years 1937–41, inclusive*

Cause (numbers in parentheses are disease title numbers from the International List of Causes of Death, 1939)	Annual number of cases per 1,000 males				
	Third quarter		First 9 months		
	1942	1941	1942	1941	1937–41
Sickness and nonindustrial injuries [1]	90.9	86.1	104.1	105.5	97.9
Nonindustrial injuries (169–195)	12.2	13.4	11.7	11.9	11.4
Sickness [1]	78.7	72.7	92.4	93.6	86.5
Respiratory diseases	26.7	22.6	39.0	44.7	38.8
Influenza and grippe (33)	8.0	5.7	14.6	21.7	18.9
Bronchitis, acute and chronic (106)	4.6	4.1	6.3	5.6	4.8
Diseases of the pharynx and tonsils (115b, 115c)	4.6	4.7	5.4	6.0	5.3
Pneumonia, all forms (107–109)	3.0	2.0	5.0	4.1	3.3
Tuberculosis of the respiratory system (13)	.8	.9	.7	.8	.8
Other respiratory diseases (104, 105, 110–114)	5.7	5.2	7.0	6.5	5.7
Digestive diseases	17.3	16.5	16.6	15.2	14.4
Diseases of the stomach, except cancer (117, 118)	5.1	4.4	4.7	4.0	3.9
Diarrhea and enteritis (120)	2.6	2.3	1.9	1.6	1.3
Appendicitis (121)	4.7	5.1	5.1	5.1	4.8
Hernia (122a)	1.8	1.5	1.8	1.6	1.6
Other digestive diseases (115a, 115d, 116, 122b–129)	3.1	3.2	3.1	2.9	2.8
Nonrespiratory-nondigestive diseases	32.8	30.1	34.8	30.6	30'6
Diseases of the heart and arteries, and nephritis (90–99, 102, 130–132)	3.4	3.5	4.3	4.1	4.2
Other genitourinary diseases (133–138)	2.5	2.8	2.5	2.4	2.4
Neuralgia, neuritis, and sciatica (87b)	1.9	1.8	2.2	2.0	2.2
Neurasthenia and the like (part of 84d)	1.2	1.1	1.1	1.0	1.0
Other diseases of the nervous system (80–85, 87, except part of 84d, and 87b)	1.1	1.2	1.1	1.2	1.1
Rheumatism, acute and chronic (58, 59)	3.6	3.5	4.0	4.0	4.0
Diseases of the organs of locomotion, except diseases of the joints (156b)	2.7	2.7	3.0	2.9	2.8
Diseases of the skin (151–153)	3.9	3.8	3.0	2.9	3.0
Infectious and parasitic diseases [2] (1–12, 14–24, 26–29, 31, 32, 34–44)	1.9	2.1	2.8	2.6	2.5
All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, 156a, 157, 162)	10.6	7.6	10.8	7.5	7.4
Ill-defined and unknown causes (200)	1.9	3.5	2.0	3.1	2.7
Average number of males covered in the record	264,945	238,407	260,677	227,704	953,078
Number of organizations	22	22			

[1] Industrial injuries, venereal diseases, and a few numerically unimportant causes of disability are not reported.
[2] Except influenza, respiratory tuberculosis, and the venereal diseases.

Table 2.—*Frequency of disabling cases of respiratory diseases lasting 8 consecutive calendar days or longer among* MALE *employees in various industries, the third quarters of 1933–42, inclusive*

Year in third quarter of which onset of disability occurred	Rate or average annual number of cases per 1,000 males					Ratio of rate to mean for 1933–42				
	All sickness	Respiratory diseases	Influenza, grippe	Bronchitis, acute and chronic	Pneumonia, all forms	All sickness	Respiratory diseases	Influenza, grippe	Bronchitis, acute and chronic	Pneumonia, all forms
1933–42 (mean)	64.2	18.5	5.1	3.0	1.5	1.00	1.00	1.00	1.00	1.00
1933	54.8	14.0	4.3	2.3	.8	.85	.76	.85	.76	.55
1934	59.1	15.9	4.2	2.1	.9	.92	.86	.83	.69	.62
1935	60.7	16.6	4.1	2.8	1.1	.95	.90	.81	.92	.76
1936	63.2	17.0	4.4	2.7	.9	.98	.92	.87	.89	.62
1937	66.9	19.5	5.2	3.1	1.6	1.04	1.05	1.03	1.02	1.10
1938	59.0	16.8	4.4	2.6	1.3	.92	.91	.87	.86	.90
1939	59.6	14.7	4.0	2.3	1.1	.93	.79	.79	.76	.76
1940	67.2	21.2	6.4	3.8	1.8	1.05	1.15	1.26	1.25	1.24
1941	72.7	22.6	5.7	4.1	2.0	1.13	1.22	1.12	1.35	1.38
1942	78.7	26.7	8.0	4.6	3.0	1.23	1.44	1.58	1.51	2.07

in table 1, are derived from analyses of periodic reports from industrial sick benefit associations, group insurance plans, and company relief departments.

While the rate for all sickness for the third quarter of 1942 represents only an 8-percent increase when compared with the corresponding rate for 1941, comparisons of the 1942 rate with the corresponding rates for previous years show the following percentage increases:

1933	44	1936	25	1939	32	1933–42	23
1934	33	1937	18	1940	17		
1935	30	1938	33	1941	8		

Thus the third quarter frequency for all sickness when compared with the corresponding rate for 1933 (54.8) shows an excess of 44 percent and when compared with the mean for 1933–42 (64.2) the excess is 23 percent.

Respiratory diseases, third quarters, 1933–42.—Interest in table 1 centers chiefly around the third quarter increase of 18 percent in the frequency of the respiratory diseases which reflects principally the following increases: influenza and grippe, 40 percent; bronchitis, 12 percent; and pneumonia, 50 percent.

Of interest are the rates yielded by these causes during the past 10 years. Table 2 shows the pertinent data and includes the third quarter rates for the three causes referred to, for the respiratory group of diseases, and for all sickness; the table also shows the ratio of each rate to the corresponding mean for the 10-year period. The actual rates are shown graphically in figure 1. It will be observed that each cause and cause group presents an increasing trend and that in each instance the third quarter rate for 1942 is the maximum for the 10-year period.

LIST OF STATE AND INSULAR HEALTH OFFICERS

(As of January 15, 1943)

State	*Name and designation*	*Location*
Alabama	Dr. B. F. Austin, State Health Officer.	Montgomery.
Alaska	Dr. Walter W Council, Commissioner of Health.	Juneau.
Arizona	Dr. G. F. Manning, State Superintendent of Health.	Phoenix.
Arkansas	Dr. William B. Grayson, State Health Officer.	Little Rock.
California	Dr. Wilton L. Halverson, State Director of Public Health.	San Francisco.
Colorado	Dr. R. L. Cleere, Secretary, State Board of Health.	Denver.
Connecticut	Dr. Stanley H. Osborn, State Commissioner of Health.	Hartford.

State	*Name and designation*	*Location*
Delaware	Dr. Edwin Cameron, Executive Secretary, State Board of Health.	Dover.
District of Columbia.	Dr. George C. Ruhland, District Health Officer.	Washington.
Florida	Dr. Henry Hanson, State Health Officer	Jacksonville.
Georgia	Dr. T. F. Abercrombie, State Director of Public Health.	Atlanta.
Hawaii	Dr. M. F. Haralson, Territorial Commissioner of Public Health, Hawaii Board of Health.	Honolulu.
Idaho	Dr. E. L. Berry, State Director of Public Health.	Boise.
Illinois	Dr. Roland R. Cross, State Director of Public Health	Springfield.
Indiana	Dr. Thurman B. Rice, Acting State Director of Public Health.	Indianapolis.
Iowa	Dr. Walter L. Bierring, State Commissioner of Health.	Des Moines.
Kansas	Dr. F. C. Beelman, Secretary and Executive Officer, State Board of Health	Topeka.
Kentucky	Dr. A. T. McCormack, State Health Commissioner.	Louisville.
Louisiana	Dr David E. Brown, President, State Board of Health.	New Orleans.
Maine	Dr. Roscoe L. Mitchell, Director, State Department of Health and Welfare.	Augusta.
Maryland	Dr Robert H. Riley, State Director of Health.	Baltimore.
Massachusetts	Dr Paul J. Jakmauh, State Commissioner of Public Health.	Boston.
Michigan	Dr. H. Allen Moyer, State Health Commissioner.	Lansing.
Minnesota	Dr. A. J. Chesley, Secretary, State Board of Health.	St. Paul.
Mississippi	Dr. Felix J. Underwood, Secretary, State Board of Health.	Jackson.
Missouri	Dr. James Stewart, State Health Commissioner	Jefferson City.
Montana	Dr. W. E. Cogswell, Secretary, State Department of Public Health.	Helena.
Nebraska	Dr. C. A. Selby, State Director of Health.	Lincoln.
Nevada	Dr. Edward E. Hamer, State Health Officer.	Carson City.
New Hampshire	Dr. A. L. Frechette, Secretary, State Board of Health.	Concord
New Jersey	Dr. J. Lynn Mahaffey, State Director of Health.	Trenton.
New Mexico	Dr. James R. Scott, Director, Department of Public Health.	Santa Fe
New York	Dr. Edward S. Godfrey, Jr., State Commissioner of Health.	Albany.
North Carolina	Dr. Carl V. Reynolds, State Health Officer.	Raleigh.

State	*Name and designation*	*Location*
North Dakota	Dr. Frank J. Hill, Acting State Officer.	Bismarck.
Ohio	Dr. R. H. Markwith, State Director of Health.	Columbus.
Oklahoma	Dr. Grady F. Mathews, State Health Commissioner	Oklahoma City.
Oregon	Dr. Frederick D. Stricker, State Health Officer.	Portland.
Pennsylvania	Dr. A. H. Stewart, Secretary of Health.	Harrisburg.
Puerto Rico	Dr. A. Fernos Isern, Health Commissioner.	San Juan.
Rhode Island	Dr. Edward A. McLaughlin, State Director of Public Health.	Providence.
South Carolina	Dr James A. Hayne, State Health Officer.	Columbia.
South Dakota	Dr J. F. D. Cook, Superintendent, State Board of Health	Pierre.
Tennessee	Dr. W. C. Williams, State Commissioner of Public Health.	Nashville.
Texas	Dr George W. Cox, State Health Officer	Austin.
Utah	Dr. William M. McKay, State Health Commissioner.	Salt Lake City
Vermont	Dr Charles F Dalton, Secretary, State Board of Health	Burlington.
Virgin Islands	Dr. Knud Knud-Hansen, Commissioner of Public Health	Charlotte Amalie.
Virginia	Dr. I. C. Riggin, State Health Commissioner.	Richmond
Washington	Dr. Donald G. Evans, Director, State Department of Health.	Seattle.
West Virginia	Dr. C F. McClintic, State Commissioner of Health.	Charleston.
Wisconsin	Dr. Carl N. Neupert, State Health Officer.	Madison.
Wyoming	Dr. M. C. Keith, State Health Officer.	Cheyenne.

INCIDENCE OF HOSPITALIZATION, DECEMBER 1942

Through the cooperation of the Hospital Service Plan Commission of the American Hospital Association, data on hospital admissions among about 8,000,000 members of Blue Cross Hospital Service Plans are presented monthly. These plans provide prepaid hospital service. The data cover about 60 hospital service plans scattered throughout the country, mostly in large cities

Item	December	
	1942	1941
1 Number of plans supplying data	65	58
2 Number of persons eligible for hospital care	9,483,924	7,283,736
3 Number of persons admitted for hospital care	75,195	59,436
4 Incidence per 1,000 persons, annual rate, during current month (daily rate × 365)	93 3	96 0
5 Incidence per 1,000 persons, annual rate for the 12 months ending December 31	107 9	107 0

DEATHS DURING WEEK ENDED JANUARY 23, 1943

From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce

	Week ended Jan. 23, 1943	Corresponding week, 1942
Data for 87 large cities of the United States:		
Total deaths	9,782	9,114
Average for 3 prior years	9,599	
Total deaths, first 3 weeks of year	30,270	28,184
Deaths under 1 year of age	686	516
Average for 3 prior years	513	
Deaths under 1 year of age, first 3 weeks of year	2,190	1,699
Data from industrial insurance companies:		
Policies in force	65,281,877	64,888,248
Number of death claims	14,910	13,533
Death claims per 1,000 policies in force, annual rate	11.9	10.9
Death claims per 1,000 policies, first 3 weeks of year, annual rate	11.2	10.3

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 30, 1943

Summary

Reports for the current week show an incidence above the corresponding 5-year (1938–42) median for only three (measles, meningococcus meningitis, and poliomyelitis) of the nine common communicable diseases included in the following tables.

The total number of meningococcus meningitis cases reported decreased from 354 to 337 for the current week, but increases occurred in a number of States. The largest numbers reported, with last week's figures in parentheses, are as follows: New York, 29 (48); California, 28 (30); Rhode Island, 23 (25); Maryland, 20 (13); Virginia, 18 (19); Pennsylvania, 15 (12); Missouri, 14 (5); New Jersey, 13 (8); Wisconsin, 13 (1); Washington, 13 (2).

There were 4,852 cases of influenza reported for the week, as compared with 4,387 for the preceding week and a 5-year median of 4,899 The largest numbers continued to be reported in Texas (1,900), South Carolina (678), and Virginia (567). Alabama reported the next largest number, 379 cases.

A total of 10,887 cases of measles was reported for the week, as compared with 8,807 for the preceding week and a 5-year median of 10,844. With reports, respectively, of 2,458 and 1,395 cases, Pennsylvania and New York contributed 35 percent of the current total.

The number of poliomyelitis cases reported increased from 25 for the preceding week to 31. The corresponding 5-year median is 26. Of the current total, 9 cases were reported in California, 5 in Texas, and 3 in Massachusetts.

Other reports for the week include 3 cases of anthrax, 222 of dysentery, 10 of infectious encephalitis, 3 of leprosy, 19 of tularemia, and 44 of endemic typhus fever.

Deaths during the current week in 90 large cities of the United States aggregated 10,181, as compared with 10,066 for the preceding week. The 3-year average for the corresponding weeks, 1940–42, is 9,812. The accumulated total for the first 4 weeks of 1943 is 41,264 as compared with 38,052 for the corresponding period in 1942.

Telegraphic morbidity reports from State health officers for the week ended January 30, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occured.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	Jan. 30, 1943	Jan. 31, 1942		Jan. 30, 1943	Jan. 31, 1942		Jan. 30, 1943	Jan. 31, 1942		Jan. 30, 1943	Jan. 31, 1942	
NEW ENG.												
Maine	0	0	0	---	1	10	6	282	143	12	1	0
New Hampshire	0	1	0	---	---	1	34	3	6	2	0	0
Vermont	0	3	0	---	---	---	324	7	22	0	0	0
Massachusetts	2	4	4	---	---	---	496	227	227	10	4	2
Rhode Island	0	2	0	---	---	---	22	117	7	23	0	0
Connecticut	0	0	2	14	5	5	372	107	107	3	1	1
MID. ATL.												
New York	12	24	28	[1] 14	[1] 13	[1] 16	1,395	514	564	29	10	4
New Jersey	1	8	12	24	13	19	431	0	28	13	2	1
Pennsylvania	8	13	26	2	---	---	2,458	1,137	1,137	15	7	7
E. NO. CEN.												
Ohio	12	11	23	9	15	15	111	152	152	5	3	2
Indiana	8	14	18	6	50	25	192	61	61	8	0	1
Illinois	14	25	33	4	13	35	273	120	120	7	0	0
Michigan [2]	6	2	8	1	2	2	135	141	427	6	1	1
Wisconsin	6	3	3	93	51	51	449	241	286	13	0	0
W. NO. CEN.												
Minnesota	5	2	3	2	3	4	19	613	235	2	0	0
Iowa	3	3	5	---	6	6	86	139	109	0	1	0
Missouri	6	5	5	6	5	33	96	55	26	14	1	2
North Dakota	1	1	3	23	5	6	42	117	18	0	0	0
South Dakota	6	0	3	---	1	2	154	2	5	1	0	0
Nebraska	0	2	2	18	---	1	201	58	28	1	0	0
Kansas	5	7	7	10	7	25	101	246	223	6	0	0
SO. ATL.												
Delaware	0	0	1	---	---	---	12	1	1	1	0	0
Maryland [2]	9	11	6	13	5	47	32	259	26	20	4	1
Dist. of Col.	1	0	3	4	1	3	51	11	11	4	4	0
Virginia	5	10	12	567	392	617	122	168	168	18	6	5
West Virginia	8	3	10	15	34	41	4	369	54	0	1	2
North Carolina	11	20	20	12	66	66	14	633	565	8	0	2
South Carolina	4	7	8	678	647	711	7	88	25	11	1	1
Georgia	7	12	8	154	183	183	27	330	63	5	0	0
Florida	11	6	6	7	10	13	11	75	72	1	3	1
E. SO. CEN.												
Kentucky	4	7	8	19	6	46	226	35	48	5	1	2
Tennessee	1	2	5	105	85	185	133	48	48	2	3	2
Alabama	13	15	12	379	644	644	11	62	81	7	3	3
Mississippi [2]	11	7	5	---	---	---	---	---	---	8	0	1
W. SO. CEN.												
Arkansas	5	8	10	150	267	267	120	204	63	2	0	1
Louisiana	8	15	10	7	26	26	69	39	3	7	1	1
Oklahoma	12	11	11	141	173	217	11	403	13	0	1	1
Texas	70	53	53	1,900	1,685	1,685	147	1,119	102	12	1	3
MOUNTAIN												
Montana	2	2	2	25	14	14	84	77	32	0	0	0
Idaho	0	1	1	---	1	1	97	25	25	1	0	0
Wyoming	0	0	1	43	37	2	21	20	10	0	1	0
Colorado	9	13	10	113	50	45	230	166	57	3	0	0
New Mexico	3	4	2	4	---	10	21	100	84	1	0	0
Arizona	3	4	4	155	131	131	15	150	10	1	0	0
Utah [2]	1	0	0	9	15	15	516	40	40	4	0	0
Nevada	0	0	---	1	---	---	8	3	---	0	0	---
PACIFIC												
Washington	9	0	2	1	58	13	810	20	82	13	0	0
Oregon	4	2	2	35	24	53	448	87	87	7	0	1
California	35	11	24	89	155	155	243	1,618	389	28	4	2
Total	341	354	383	4,852	4,899	4,899	10,887	10,489	10,844	339	65	55
4 weeks	1,355	1,481	1,829	17,421	16,925	16,925	36,101	36,328	36,655	1,280	230	210

See footnotes at end of table

Telegraphic morbidity reports from State health officers for the week ended January 30, 1943, and comparison with corresponding week of 1942 and 5-year median—Continued

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median 1938-42	Week ended—		Median 1938-42	Week ended		Median 1938-42	Week ended—		Median 1938-42
	Jan 30, 1943	Jan 31, 1942		Jan 30, 1943	Jan 31, 1942		Jan 30, 1943	Jan 31, 1942		Jan 30, 1943	Jan 31, 1942	
NEW ENG.												
Maine	1	0	0	8	21	17	0	0	0	0	0	1
New Hampshire	0	1	0	11	25	8	0	0	0	1	0	0
Vermont	0	0	0	1	4	11	0	0	0	0	1	0
Massachusetts	3	1	0	416	324	194	0	0	0	2	2	2
Rhode Island	0	0	0	29	10	10	0	0	0	0	0	0
Connecticut	0	0	0	65	31	74	0	0	0	2	0	0
MID ATL												
New York	1	3	1	416	388	556	0	0	0	3	3	6
New Jersey	0	1	1	88	104	177	0	0	0	1	0	0
Pennsylvania	0	1	1	0	348	351	0	0	0	5	6	6
E NO CEN												
Ohio	1	0	0	318	339	376	2	0	1	0	3	2
Indiana	0	5	0	126	125	188	12	2	7	2	3	1
Illinois	0	1	1	201	252	489	0	0	1	1	1	2
Michigan [2]	0	1	0	100	207	317	1	1	2	2	1	1
Wisconsin	0	0	0	264	214	214	1	0	2	1	2	0
W NO CEN.												
Minnesota	1	0	0	67	93	125	0	1	13	0	1	1
Iowa	0	0	0	63	47	71	1	1	11	0	1	2
Missouri	0	1	0	110	56	91	0	1	6	0	0	2
North Dakota	0	0	0	16	19	21	0	0	0	0	0	0
South Dakota	0	0	0	38	32	21	0	0	0	0	0	0
Nebraska	0	0	0	23	34	36	0	2	2	0	0	0
Kansas	0	0	0	58	90	114	0	1	2	0	0	0
SO ATL												
Delaware	0	0	0	6	52	14	0	0	0	0	0	0
Maryland [2]	0	0	0	81	75	67	0	0	0	1	2	2
Dist of Columbia	0	0	0	29	13	13	0	0	0	1	1	0
Virginia	0	0	0	45	50	50	0	0	0	5	5	2
West Virginia	0	0	0	27	56	56	0	0	0	0	0	1
North Carolina	1	0	1	63	72	58	0	0	0	1	0	0
South Carolina	0	2	1	12	6	6	0	0	0	0	1	1
Georgia	0	1	0	33	48	18	1	2	0	2	10	3
Florida	1	0	1	11	7	7	0	0	0	0	1	1
E SO. CEN.												
Kentucky	2	0	1	50	100	71	0	0	0	0	2	2
Tennessee	0	0	0	43	81	54	0	3	1	2	4	3
Alabama	1	1	1	16	18	18	2	0	0	0	2	2
Mississippi [2]	0	0	0	11	8	7	0	1	1	1	1	1
W SO CEN												
Arkansas	1	0	0	7	6	9	2	1	1	2	3	3
Louisiana	1	0	1	10	9	16	0	1	0	4	6	4
Oklahoma	0	0	0	29	24	43	0	1	1	1	1	3
Texas	5	1	1	56	64	66	0	6	6	2	5	5
MOUNTAIN												
Montana	0	0	0	9	32	30	0	0	0	0	0	0
Idaho	0	0	0	3	3	9	0	0	0	0	1	1
Wyoming	0	0	0	53	12	12	0	0	0	0	0	0
Colorado	1	0	0	79	43	36	0	0	4	1	0	1
New Mexico	0	1	0	7	9	12	1	0	0	0	0	2
Arizona	0	0	0	5	7	7	0	0	0	0	0	0
Utah [2]	0	0	0	59	38	25	0	0	0	0	0	0
Nevada	0	0	------	0	0	-----	0	0	---	0	0	---
PACIFIC												
Washington	1	1	1	25	29	61	0	0	1	1	1	1
Oregon	1	0	0	20	11	46	0	0	0	0	1	0
California	9	2	2	191	110	192	1	2	3	2	1	3
	31	24	26	3,401	3,746	4,528	24	26	55	46	72	79
	136	109	109	14,150	14,120	16,488	127	67	519	201	315	329

See footnotes at end of table

Telegraphic morbidity reports from State health officers for the week ended January 30, 1943, and comparison with corresponding week of 1942 and 5-year median—Continued

Division and State	Whooping cough, Week ended— Jan 20, 1943	Whooping cough, Week ended— Jan 31, 1942	Whooping cough, Median 1938-42	Week ended Jan 30, 1943: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt spotted fever	Tularemia	Typhus fever
NEW ENG.												
Maine	81	47	47	0	0	0	0	0	0	0	0	0
New Hampshire	18	26	3	0	0	0	0	0	0	0	0	0
Vermont	34	57	57	0	0	0	0	0	0	0	0	0
Massachusetts	173	304	189	0	0	0	0	0	0	0	0	0
Rhode Island	24	51	51	0	0	0	0	0	0	0	0	0
Connecticut	71	132	78	0	0	1	0	2	0	0	0	0
MID ATL.												
New York	388	683	462	1	4	19	0	0	2	0	0	0
New Jersey	150	235	187	0	1	0	0	0	0	0	0	0
Pennsylvania	379	288	349	0	0	0	0	0	0	0	1	0
E. NO. CEN.												
Ohio	277	331	265	0	0	0	0	0	0	0	0	0
Indiana	22	58	23	0	0	0	0	0	0	0	1	0
Illinois	188	213	112	0	0	2	0	2	0	0	0	0
Michigan [2]	326	262	229	0	0	1	0	0	0	0	0	0
Wisconsin	210	371	198	0	0	0	0	1	0	0	0	0
W. NO. CEN.												
Minnesota	74	136	52	0	1	5	0	0	0	0	0	0
Iowa	18	35	21	0	0	0	0	0	0	0	0	0
Missouri	28	14	23	0	0	0	1	0	0	0	1	0
North Dakota	11	15	15	0	0	0	0	0	0	0	0	0
South Dakota	0	11	3	0	0	0	0	0	0	0	0	0
Nebraska	3	8	3	0	0	0	0	0	0	0	0	0
Kansas	43	66	66	0	0	0	0	0	0	0	0	0
SO. ATL.												
Delaware	7	2	7	0	0	0	0	0	0	0	0	0
Maryland [2]	73	41	44	0	0	0	1	0	0	0	1	0
Dist. of Col.	10	22	7	0	0	0	0	0	0	0	0	0
Virginia	56	77	77	0	0	0	34	0	0	0	0	0
West Virginia	61	49	49	0	0	0	0	0	0	0	0	0
North Carolina	79	232	232	0	0	0	0	0	0	0	1	2
South Carolina	31	100	66	0	0	0	0	0	0	0	2	1
Georgia	27	34	27	0	1	1	3	1	0	0	5	18
Florida	26	28	11	0	1	0	0	0	0	0	0	2
E. SO. CEN.												
Kentucky	50	106	40	0	0	0	0	0	0	0	0	0
Tennessee	53	14	22	0	2	0	1	0	0	0	4	0
Alabama	41	26	26	0	1	0	0	1	0	0	1	2
Mississippi [2]	------	-	-----	0	0	0	0	0	0	0	1	0
W. SO. CEN.												
Arkansas	35	15	17	0	1	1	0	0	0	0	1	1
Louisiana	10	5	5	1	1	0	0	0	1	0	0	1
Oklahoma	7	8	8	0	0	0	0	1	0	0	0	0
Texas	295	139	136	1	0	116	0	1	0	0	0	15
MOUNTAIN												
Montana	45	11	14	0	0	0	0	0	0	0	0	0
Idaho	2	6	6	0	0	0	0	0	0	0	0	0
Wyoming	4	10	10	0	0	0	0	0	0	0	0	0
Colorado	22	27	32	0	0	0	0	0	0	0	0	0
New Mexico	24	39	39	0	0	0	1	1	0	0	0	0
Arizona	14	83	12	0	0	0	12	0	0	0	0	0
Utah [2]	32	37	46	0	0	0	0	0	0	0	0	0
Nevada	0	0	-------	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	28	136	96	0	0	0	0	0	0	0	0	0
Oregon	10	36	28	0	0	10	0	0	0	0	0	0
California	206	202	202	0	0	0	0	0	0	0	0	2
Total	3,846	4,828	4,294	3	13	156	53	10	3	0	19	44
4 weeks	15,883	17,374	17,010	------	------	------	------	------	------	------	------	------

[1] New York City only
[2] Period ended earlier than Saturday.

WEEKLY REPORTS FROM CITIES

City reports for week ended January 16, 1943

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga	1	0	24	0	2	0	6	0	12	0	0	4
Baltimore, Md	1	0	7	3	5	5	31	0	28	0	0	81
Barre, Vt	0	0	------	0	0	0	0	0	0	0	0	0
Billings, Mont	0	0	------	0	0	0	0	0	0	0	0	0
Birmingham, Ala	1	0	19	0	0	0	8	1	1	0	0	1
Boise, Idaho	0	0	------	0	0	0	2	0	2	0	0	0
Boston, Mass	0	0	------	1	92	1	21	0	111	0	0	44
Bridgeport, Conn	0	1	------	0	0	0	0	0	6	0	0	1
Brunswick, Ga	0	0	------	0	1	0	2	0	0	0	0	0
Buffalo, N. Y	0	0	------	0	68	0	11	0	9	0	1	26
Camden, N. J	4	0	------	0	12	0	2	0	1	0	0	7
Charleston, S. C	0	0	118	0	0	0	3	0	3	0	0	1
Charleston, W. Va	0	0	------	0	0	0	0	0	1	0	0	0
Chicago, Ill	5	0	7	4	100	1	40	0	77	0	0	70
Cincinnati, Ohio	0	0	1	2	21	3	5	0	25	0	0	5
Cleveland, Ohio	1	0	11	4	2	0	8	0	31	1	0	64
Columbus, Ohio	0	0	------	0	2	0	4	0	20	0	0	11
Concord, N. H	0	0	------	0	1	0	0	0	1	0	0	0
Cumberland, Md	1	0	------	0	0	0	0	0	0	0	0	0
Dallas, Tex	0	0	1	0	0	0	8	1	1	0	0	4
Denver, Colo	8	0	26	1	37	0	4	0	8	0	0	10
Detroit, Mich	0	0	------	1	13	0	30	0	36	0	0	147
Duluth, Minn	0	0	------	1	0	0	2	0	6	0	0	6
Fall River, Mass	0	0	------	1	1	0	2	0	7	0	0	23
Fargo, N. Dak	0	0	------	0	0	0	0	0	0	0	0	0
Flint, Mich	1	0	------	0	0	0	2	0	6	0	0	19
Fort Wayne, Ind	1	0	------	0	0	0	2	0	0	0	0	0
Frederick, Md	0	0	------	0	0	0	0	0	0	0	0	0
Galveston, Tex	0	0	1	0	0	0	1	0	0	0	0	1
Grand Rapids, Mich	0	0	------	0	0	0	4	0	2	0	0	2
Great Falls, Mont	0	0	------	0	6	0	0	0	1	0	0	15
Hartford, Conn	0	0	------	0	6	0	8	0	3	0	0	6
Houston, Tex	1	0	------	0	0	0	13	0	2	0	0	1
Indianapolis, Ind	9	0	------	3	70	1	10	0	20	0	0	15
Kansas City, Mo	0	0	------	0	10	1	14	1	42	0	0	7
Kenosha, Wis	0	0	------	0	1	0	0	0	5	0	0	0
Little Rock, Ark	0	0	1	0	0	0	4	0	0	0	0	0
Los Angeles, Calif	2	0	20	1	34	1	8	1	29	0	0	32
Lynchburg, Va	0	0	------	0	1	0	0	0	1	0	0	0
Memphis, Tenn	0	0	10	1	7	3	9	0	8	0	0	9
Milwaukee, Wis	0	0	------	0	128	0	7	0	130	0	0	40
Minneapolis, Minn	1	0	------	0	5	0	7	0	17	0	0	12
Missoula, Mont	0	0	------	0	0	0	0	0	1	0	0	1
Mobile, Ala	1	0	3	2	0	0	1	0	2	0	0	1
Nashville, Tenn	0	0	------	0	10	0	1	0	0	0	0	5
Newark, N. J	0	0	7	0	42	3	4	0	18	0	0	10
New Haven, Conn	0	0	------	0	2	0	1	0	1	0	0	4
New Orleans, La	1	0	1	2	4	1	18	0	8	0	0	1
New York, N. Y	14	0	22	4	49	15	78	1	225	0	3	93
Omaha, Nebr	1	0	------	0	3	0	5	0	2	0	0	1
Philadelphia, Pa	3	0	2	2	977	8	36	0	88	0	0	69
Pittsburgh, Pa	2	0	2	1	2	1	19	10	14	0	0	25
Portland, Maine	0	0	------	1	1	13	5	0	8	0	0	34
Providence, R. I	2	0	------	0	4	4	4	0	7	0	0	13
Pueblo, Colo	1	0	------	0	1	0	4	0	3	0	0	1
Racine, Wis	0	0	------	0	13	0	0	0	20	0	0	0
Reading, Pa	0	0	------	1	40	0	4	0	0	0	0	6
Richmond, Va	0	0	1	1	1	4	5	0	1	0	0	4

City reports for week ended January 16, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Roanoke, Va	0	0	------	0	0	0	1	0	1	0	0	0
Rochester, N. Y	0	0	------	0	20	0	4	1	6	0	0	27
Sacramento, Calif	4	0	1	1	0	0	7	0	2	0	0	7
Saint Joseph, Mo	0	0	------	0	0	1	2	0	1	0	0	0
St. Louis, Mo	0	1	7	1	8	8	14	0	20	0	0	21
St. Paul, Minn	0	0	------	2	2	0	13	0	12	0	0	37
Salt Lake City, Utah	0	0	------	0	148	1	2	0	20	0	0	9
San Antonio, Tex	1	0	2	2	0	0	7	3	2	0	0	3
San Francisco, Calif	0	0	2	1	14	5	15	0	13	0	0	18
Savannah, Ga	0	0	8	1	0	2	7	0	1	0	0	7
Seattle, Wash	2	0	------	0	41	0	10	0	4	0	0	7
Shreveport, La	0	0	------	0	0	0	8	0	3	0	0	0
South Bend, Ind	0	0	------	0	1	0	0	0	4	0	0	2
Spokane, Wash	0	0	1	1	53	0	4	0	0	0	0	1
Springfield, Ill	0	0	------	0	0	0	4	0	1	0	0	22
Springfield, Mass	0	0	------	0	5	0	1	0	76	0	0	1
Superior, Wis	0	0	------	0	2	0	3	0	2	0	0	6
Syracuse, N. Y	0	0	------	0	6	2	2	0	9	0	0	32
Tacoma, Wash	0	0	------	0	62	0	1	1	4	0	0	1
Tampa, Fla	0	0	------	1	1	0	1	0	0	0	0	1
Terre Haute, Ind	0	0	------	1	0	0	1	0	0	0	0	0
Topeka, Kans	0	0	------	0	16	0	2	0	3	0	0	3
Trenton, N. J	2	0	------	0	1	0	4	0	7	0	0	4
Washington, D. C	2	0	4	3	13	4	8	0	25	0	2	13
Wheeling, W. Va	0	0	------	0	1	0	3	0	1	0	0	3
Wichita, Kans	1	0	------	0	7	0	2	0	5	0	0	6
Wilmington, Del	0	0	------	0	2	0	7	0	1	0	0	1
Wilmington, N. C	1	0	------	0	3	0	3	0	0	0	0	12
Winston-Salem, N. C	0	0	------	0	2	0	3	0	0	0	0	22
Worcester, Mass	0	0	------	0	21	0	13	0	6	0	0	16
Total	75	2	309	51	2,203	89	615	7	1,279	1	6	1,214
Corresponding week 1942	100	4	290	44	1,132	26	507	6	1,125	1	12	1,237
Average, 1938–42	118	------	1,804	[1] 85	[2] 2,659	------	[1] 575	------	1,212	21	15	1,116

[1] 3-year average, 1940–42.
[2] 5-year median.

Dysentery, amebic.—Cases: New York, 1; San Francisco, 1.
Dysentery, bacillary.—Cases: Buffalo, 1; Charleston, S. C., 1; Hartford, 1; Los Angeles, 5; New York, 10.
Typhus fever.—Cases: Atlanta, 4; Birmingham, 1; Houston, 1; Mobile, 1; New Orleans, 1; Savannah, 1.

PLAGUE INFECTION IN TACOMA, WASH.

Plague infection has been reported proved in two pools of tissue from rats, *R. norvegicus*, (four rats in each pool), taken in Tacoma, Wash., during the periods January 6 to 8 and January 8 and 9, and in tissue from one rat, proved separately, taken on January 9.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—During the week ended January 9, 1943, one rat proved positive for plague was reported in Paauhau area, Hamakua District, Island of Hawaii, T. H.

FOREIGN REPORTS

CUBA

Habana—Communicable diseases—4 weeks ended December 12, 1942.—During the 4 weeks ended December 12, 1942, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	18	1	Tuberculosis	6	2
Malaria	33		Typhoid fever	24	1
Poliomyelitis	4	1			

SWEDEN

Notifiable diseases—November 1942.—During the month of November 1942, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	9	Poliomyelitis	88
Diphtheria	297	Scarlet fever	2,538
Dysentery	95	Syphilis	43
Epidemic encephalitis	4	Typhoid fever	23
Gonorrhea	1,328	Undulant fever	3
Paratyphoid fever	5	Weil's disease	6

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Belgian Congo—Blukwa.—During the week ended December 26, 1942, 1 fatal case of plague was reported in Blukwa, Belgian Congo.

Typhus Fever

Mexico—Mexico, D. F.—Typhus fever has been reported in Mexico, D. F., as follows: For the 5 weeks ended October 31, 1942, 72 cases with 18 deaths. Weeks ended November 7, 30 cases, 3 deaths; November 14, 24 cases, 4 deaths; November 21, 24 cases, 3 deaths; November 28, 18 cases, 4 deaths.

COURT DECISIONS ON PUBLIC HEALTH

Process or renovated butter—Federal regulation of—effect on State action.—(United States Supreme Court; *Cloverleaf Butter Co.* v. *Patterson, Commissioner of Agriculture and Industries of Alabama, et al.*, 315 U. S. 148; decided February 2, 1942.) The plaintiff company was engaged in the manufacture at Birmingham, Ala., of process or renovated butter from packing stock butter. One-fourth of the company's packing stock butter was obtained in Alabama and three-fourths in other States. The company shipped interstate 90 percent of its finished product. The production of renovated butter was taxed and regulated by the United States and was also regulated by Alabama. The defendant Alabama officials, who had the duty of enforcing the Alabama laws regarding renovated butter, entered petitioner's factory and, in a little more than a year, seized on 16 separate occasions a total of over 20,000 pounds of packing stock butter, the material from which the finished product was made. The defendants also seized some butter moving to the factory in interstate commerce. The company sought to enjoin the defendants from acting under the State statute, either to determine the wholesomeness of renovated butter made from the raw material in the company's hands, to inspect its raw material and plant, or to seize and to detain the company's packing stock butter. The theory of the bill of complaint was that the Federal legislation and regulations concerning the manufacture of process or renovated butter excluded such State action. The Federal district court and circuit court of appeals ruled against the company and the case was carried to the United States Supreme Court.

The latter court in its opinion said: "The controversy comes to this: The Federal law requires * * * 'a rigid sanitary inspection * * * of all factories and storehouses where process or renovated butter is manufactured, packed, or prepared for market, and of the products thereof and materials going into the manufacture of the same,' i. e., packing stock butter. But, as we have seen, the Secretary of Agriculture of the United States cannot condemn the packing stock butter. The Commissioner of Agriculture and Industries of Alabama claims authority under the State statute to condemn packing stock butter held for renovation. Does the State's claim interfere or conflict with the Federal power?" The court determined that the State's claim did interfere or conflict with the purpose or provisions of the Federal legislation. It was pointed out that the manufacture and distribution in interstate and foreign commerce of process and renovated butter constituted a substantial industry

which, because of its multi-State activity, could not be effectively regulated by isolated competing States and that Congress undertook to regulate production in order that the resulting commodity might be free of ingredients deleterious to health. The States were left free to act on the packing stock supplies prior to their delivery into the hands of the manufacturer and to regulate sales of the finished product within their borders. However, once the material was definitely marked for commerce by acquisition of the manufacturer, it passed into the domain of Federal control. Inspection of the factory and of the material was provided for explicitly and confiscation of the finished product was authorized upon a finding of its unsuitability for food through the use of unhealthful or unwholesome materials. By the statutes and regulations, continued the court, the Federal Department of Agriculture had authority to watch the consumer's interest throughout the process of manufacture and distribution. "It sees to the sanitation of the factories in such minutiae as the clean hands of the employees and the elimination of objectionable odors, inspects the materials used, including air for aerating the oils, and confiscates the finished product when materials which would be unwholesome if utilized are present after manufacture. Confiscation by the State of material in production nullifies Federal discretion over ingredients." The court held that, since there was Federal regulation of the materials and composition of the manufactured article, there could not be similar State regulation of the same subject.

The judgment dismissing the bill of complaint was reversed.

Amebic dysentery—additional compensation under workmen's compensation act for employer's serious and willful misconduct—violation of health statute by employer.—(California Supreme Court; *Parkhurst* v. *Industrial Accident Commission et al.*, 129 P.2d 113; decided September 24, 1942.) An iron worker in the course of his employment on a building project contracted amebic dysentery through the drinking water furnished. The State industrial accident commission awarded him compensation for an injury received in the course of his employment but denied an additional award claimed by reason of the alleged serious and willful misconduct of the employer. In a proceeding by the employee, the issue before the Supreme Court of California was whether the commission's determination that the employee's injury was not caused by the serious and willful misconduct of the employer found support in the record.

It appeared that the employer, who commenced work as a subcontractor after construction was under way, accepted the facilities

furnished by the general contractor. The water was supplied to the men by an open bucket and common dipper, in violation of statutes requiring closed containers and individual drinking cups. According to the supreme court serious and willful misconduct was conduct that the employer knew, or should have known, was likely to cause serious injury, or conduct that evinced a reckless disregard for the safety of others. In the present case, said the court, the employer, by knowingly violating its statutory duty to supply its employees with pure drinking water in closed containers and individual cups, set the conditions for the transmission of various communicable diseases and exposed its employees to the hazard of serious injury therefrom. "It has long been recognized that communicable diseases are readily transmitted by common drinking cups and the statutes in the present case were designed to safeguard employees against that hazard. Violation of these statutes is particularly serious when hundreds of men are employed on the same project at the same time and do not have access to other drinking water. The employer is charged with knowledge of the statute * * * and was found by the commission to know that the water was distributed in violation of the statutory requirements." Violation of the statutes in question was said by the court to be not mere negligence but criminal conduct punishable as a misdemeanor, and a prior California case was quoted wherein it was stated that, where there was a deliberate breach of a law which was framed in the interests of the workingman, it would be held that such a breach amounted to serious misconduct. The court then reviewed the evidence and determined that there was no substantial evidence in the record to support the commission's conclusion that the injury was not caused by the serious and willful misconduct of the employer despite the violation of the statutes.

The order denying additional compensation was annulled.

Narcotic drugs—Harrison Act construed.—(United States Supreme Court; *Young* v. *United States*, 315 U. S. 257; decided February 2, 1942.) Section 6 of the Harrison Anti-Narcotic Act provided that the act's provisions should not be construed to apply to the manufacture, sale, distribution, giving away, dispensing, or possession of preparations and remedies containing only a limited amount of narcotics, but such section contained a proviso which read as follows: "Provided further, That any manufacturer, producer, compounder, or vendor (including dispensing physicians) of the preparations and remedies mentioned in this section lawfully entitled to manufacture, produce, compound, or vend such preparations and remedies, shall keep a record of all sales, exchanges, or gifts of such preparations and

remedies * * *." In a case before it involving this proviso, the Supreme Court of the United States expressed itself as being of the view "that Congress, by the use of the words 'dispensing physicians,' meant to exclude physicians administering to patients whom they personally attend."

Food containing trichinae—illness caused by—liability of packing company and retailer.—(New York Supreme Court, Appellate Division, Second Department; *Catalanello et al.* v. *Cudahy Packing Company et al.*, 34 N.Y.S.(2d)37; decided April 6, 1942.) In an action brought against a packing company and a retailer to recover damages for injuries sustained from eating a processed salami, it appeared that the salami (a) was processed by the defendant packer for comsumption without cooking or further processing and so sold by the defendant retailer to one of the plaintiffs and (b) was found by the trial court to contain trichinae sufficient to render the plaintiffs ill. The appellate division of the New York Supreme Court said that the salami would be deemed adulterated so as to be unfit for food within the meaning of a section of the agriculture and markets law and that the violation by the defendants of the duty imposed upon them by certain sections of the said law not to process or sell an article of food which was adulterated constituted an actionable wrong. Since the salami was unfit for food there was also, according to the court, a breach of the implied warranty of the fitness of food for human consumption and, the retailer having been found liable, recovery over by him against the packing company was properly allowed.

×

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements, should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 58 FEBRUARY 12, 1943 NUMBER 7

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol. 58 • FEBRUARY 12, 1943 • *No. 7*

DISTRIBUTION OF HEALTH SERVICES IN THE STRUCTURE OF STATE GOVERNMENT *

CHAPTER IX. CENTRAL STATE SERVICES AFFECTING ALL BRANCHES OF PUBLIC HEALTH WORK

By JOSEPH W. MOUNTIN, *Assistant Surgeon General*, and EVELYN FLOOK, *United States Public Health Service*

Each of the previous articles of this series* describing State health services as organized and administered during the year 1940 has been focused upon the combined efforts of all agencies of State government in specific service categories or toward the correction of a particular health problem. In addition to administering health programs for special purposes, a number of governmental units perform central services of a generalized nature which contribute to all branches of public health work.

Consideration of these miscellaneous central services forms the topic of the present discussion, which is the ninth chapter of the third edition of Public Health Bulletin No. 184. In this, as in all earlier

* From the States Relations Division. This is the ninth chapter of the third edition of Public Health Bulletin No. 184. Previous chapters are:

Mountin, Joseph W., and Flook, Evelyn: Distribution of health services in the structure of State government—Chapter I. The composite pattern of State health services. Pub. Health Rep., 56: 1673 (August 22, 1941). Reprint No. 2306.

Mountin, Joseph W., and Flook, Evelyn: Distribution of health services in the structure of State government—Chapter II. Communicable disease control by State agencies. Pub. Health Rep., 56: 2233 (November 21, 1941). Reprint No. 2334.

Mountin, Joseph W., and Flook, Evelyn: Distribution of health services in the structure of State government—Chapter III. Tuberculosis control by State agencies. Pub. Health Rep., 57: 65 (January 16, 1942). Reprint No. 2348.

Mountin, Joseph W., and Flook, Evelyn: Distribution of health services in the structure of State government—Chapter IV. Venereal disease control by State agencies. Pub. Health Rep., 57: 563 (April 17, 1942). Reprint No. 2369.

Mountin, Joseph W., and Flook, Evelyn: Distribution of health services in the structure of State government—Chapter V. Sanitation by State agencies. Pub. Health Rep., 57: 885 (June 12, 1942) and 57: 917 (June 19, 1942). Reprint No. 2386.

Mountin, Joseph W., and Flook, Evelyn: Distribution of health services in the structure of State government—Chapter VI. Medical and dental care by State agencies. Pub. Health Rep., 57: 1195 (August 14, 1942) and 57: 1235 (August 21, 1942). Reprint No. 2395.

Mountin, Joseph W., and Flook, Evelyn: Distribution of health services in the structure of State government—Chapter VII. Maternity-child health activities by State agencies. Pub. Health Rep., 57: 1791 (November 27, 1942). Reprint No. 2425.

Mountin, Joseph W., and Flook, Evelyn: Distribution of health services in the structure of State government—Chapter VIII. Industrial health services by State agencies. Pub. Health Rep., 58: 33 (January 8, 1943). Reprint No. 2439.

The concluding chapter will be published in a subsequent issue of the Public Health Reports.

chapters of the current version of the bulletin, the methods by which all State departments, boards, and commissions function with respect to the service in question are depicted. Thus, the third edition is broader in scope than the former issue,[1] which treated the activities of health departments only. Neither the activities of local official agencies nor of voluntary health organizations are included in the present revision unless they contribute to budgets of official State agencies.

General services which are provided by the States [2] and which affect all branches of public health work are: Vital statistics, laboratory services, health education, and licensure of professions and facilities which afford health services. From table 1 may be identified the particular agency of State government which is responsible for certain activities outlined in connection with each service.

TABLE 1.—*Department of State government* responsible for miscellaneous services affecting all branches of public health work in each State and Territory, the District of Columbia, and the Virgin Islands***

Activity	State or Territory							
	Alabama	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia
VITAL STATISTICS:								
Receives the following reports:								
Births	1	1	1	1	1	1	1	1
Deaths	1	1	1	1	1	1	1	1
Marriages	1	------	1	1	-----	1	1	------
Divorces	1	------	------	------	------	1	1	------
Morbidity reports (covered in chapters II, III, IV, VI, and VIII of this series).								
Analyzes the reports received	1	1	1	1	1	1	1	1
Allocates births and deaths to place of residence	1	------	[b] 1	------	1	1	[c] 1	1
Furnishes other agencies and divisions with copies of reports or results of analyses:								
Routinely	------	1	1	1	1	------	------	1
Upon request	1	1	1	1	1	1	1	1
Makes payments from State funds for vital statistics reports submitted by local registrars	------	------	1	------	------	------	------	------
Certifies for payment by local authorities vital statistics reports submitted by local registrars	1	1	------	1	1	1	1	------
LABORATORY SERVICES:								
Examines the following types of specimens:								
Venereal disease	1	7	[d] 1	1	1	1	1	1
Other communicable disease	1	7	1	1	1	1	1	1
Noncommunicable disease	[d] 6	7	1, 6	------	[d] 6	------	1	1
Water samples	1	7	1	1	1	1	1	1
Milk samples	1	7	------	1	------	1	1	1
Food and drug samples	8	7	------	1	7	14	1	1
Substances affecting industrial health	1	------	------	1	1	1	------	------
Engages in research activities	1	6, 7	------	1	1	1	------	------
Manufactures biologicals distributed at State expense	1	7	1	1	------	------	------	1
Operates branch laboratories	1	7	------	------	------	------	1	1

See footnotes at end of table.

[1] Ferrell, John A., Smillie, Wilson G., Covington, Platt W., and Mead, Pauline A.; International Division of the Rockefeller Foundation for the Conference of State and Provincial Health Authorities of North America: Health Departments of States and Provinces of the United States and Canada. Public Health Bulletin No. 184 (Revised). United States Government Printing Office, Washington, 1932.

[2] The term "State" as used in the discussion which follows includes the States, the Territories, the District of Columbia, and the Virgin Islands.

TABLE 1.—*Department of State government responsible for miscellaneous services affecting all branches of public health work in each State and Territory, the District of Columbia, and the Virgin Islands*—Continued

Activity	State or Territory							
	Alabama	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia
LABORATORY SERVICES—Continued.								
Distributes grants-in-aid to local laboratories	----	------	------	1	1	1	------	------
Maintains general supervision over private laboratories	------	------	------	1	------	1	------	------
Approves private laboratories for selected types of work only	------	------	------	------	1	------	1	------
HEALTH EDUCATION:								
Provides in-service training for public health personnel:								
Physicians	1	------	1	1	1	------	1	1
Nurses	1	1	1	1	1	1	1	1
Sanitation personnel	1	1	1	1, 6	1	1	1	1, 14
Dentists and/or dental hygienists	1	------	------	1	------	------	1	1
Laboratory personnel	1	---	1	------	------	------	1	1
Others	1	1	1	------	------	------	------	------
Provides academic training for public health personnel:								
Physicians	1	1	1	1	1	1	1	1
Nurses	1	1	1	1	1	1	1	1
Sanitation personnel	1	1	1	1	1	1	1	1
Dentists and/or dental hygienists	------	------	1	1	------	------	1	1
Laboratory personnel	1	------	------	1	------	1	------	------
Others	------	------	------	1	------	1	------	------
Engages in postgraduate educational activities for private practitioners:								
Physicians	1	1	1	1	1	1	1	1
Nurses	------	------	------	------	------	1	------	------
Dentists	1	------	------	1	------	------	------	------
Others	------	------	------	------	------	------	------	------
Engages in health education activities for lay persons through:								
Group instruction	1	1	1	1, 3, 4, 6	1	1	1	1
Radio	1	1	1	1, 3, 4, 6	1	1	1	1
Bulletins and pamphlets	1	1	1	1, 3, 4, 6	1	1	1	1
Exhibits	1	1	1	1, 3, 4, 6	1	1	1	1
Press releases	1	1	------	1	1	1	1	1
Motion pictures	1	1	1	1	1	1	1	------
Employs special personnel for the editing and release of educational material	1	1	------	------	------	1	------	1
LICENSURE:								
Licenses members of the healing arts:								
Physicians	9	9, 13	9	9	9	1	9	8
Osteopaths	9	9, 13	13	13	9	1, 13	------	8
Chiropractors	9	• 13	13	13	13	1, 13	13	8
Optometrists	9	13	13	13	13	1, 13	13	13
Nurses	10	10	10	10	10	1, 10	10	10
Dentists	11	11	11	11	11	11	11	11
Dental hygienists	------	------	11	11	11	11	11	11
Pharmacists	12	12	12	12	12	12	12	12
Others	9	• 13	13	9	------	1, 13	13	8
Licenses embalmers and/or funeral directors	13	13	13	13	13	13	13	1
Licenses midwives (covered in chapter VII of this series).								
Licenses sanitation personnel: Plumbers, swimming-pool operators, operators of water and sewage treatment plants (covered in chapter V of this series).								
Licenses barbers and beauticians (covered in chapter V of this series).								
Licenses hospitals and/or other health facilities (covered in chapters III, VI, and VII of this series).								

See footnotes at end of table.

TABLE 1.—*Department of State government responsible for miscellaneous services affecting all branches of public health work in each State and Territory, the District of Columbia, and the Virgin Islands*—Continued

Activity	State or Territory							
	Florida	Georgia	Idaho [a]	Illinois	Indiana	Iowa	Kansas	Kentucky
VITAL STATISTICS:								
Receives the following reports:								
Births	1	1	1	1	1	1	1	1
Deaths	1	1	1	1	1	1	1	1
Marriages	1	-----	1	-----	-----	1	1	-----
Divorces	1	-----	-----	-----	-----	1	-----	-----
Morbidity reports (covered in chapters II, III, IV, VI, and VIII of this series).								
Analyzes the reports received	1	1	1	1	1	1	1	1
Allocates births and deaths to place of residence	1	1	-----	1	-----	[b] 1	1	1
Furnishes other agencies and divisions with copies of reports or results of analyses:								
Routinely	1	1	1	1	-----	1	1	1
Upon request	1	1	1	1	1	1	1	1
Makes payments from State funds for vital statistics reports submitted by local registrars	1	-----	-----	-----	-----	-----	-----	-----
Certifies for payment by local authorities vital statistics reports submitted by local registrars	-----	1	1	1	-----	1	1	1
LABORATORY SERVICES:								
Examines the following types of specimens:								
Venereal disease	1	1	1	1	1	1, 6	[d] 1	1
Other communicable disease	1	1	1	1	1	1, 6	1	1
Noncommunicable disease	-----	1	1	-----	1, 6	-----	[d] 1	1
Water samples	1	1	1	1	[f] 1	1, 6	[f] 1, [f] 6	1
Milk samples	1	3	1	3	1	1, 3, 6	1	1
Food and drug samples	3	3	1	3	1	3	1, 6	1
Substances affecting industrial health	-----	-----	1	1, 5	1	1	1	-----
Engages in research activities	1	1, 3	-----	1, 5	1, 6	1, 6	1	-----
Manufactures biologicals distributed at State expense	-----	1	-----	1	-----	1, 6	1	1
Operates branch laboratories	1	1	1	1	-----	-----	1	1
Distributes grants-in-aid to local laboratories	-----	1	-----	-----	-----	-----	1	1
Maintains general supervision over private laboratories	-----	-----	-----	1	-----	-----	-----	-----
Approves private laboratories for selected types of work only	-----	[h] 1	-----	-----	1	[h] 1, [h] 6	[h] 1	1
HEALTH EDUCATION:								
Provides in-service training for public health personnel:								
Physicians	1	1	1	1	1, 2, 6	1	1	1
Nurses	1	1	1	1	1, 2	1	1	1
Sanitation personnel	1, 3, 14	1, 3, 6	1	1, 6	1	1, 6	1	1
Dentists and/or dental hygienists	-----	-----	-----	1	1, 6	-----	1	1
Laboratory personnel	1	-----	1	1	1, 6	1, 6	1	1
Others	-----	-----	-----	1	1	-----	2	-----
Provides academic training for public health personnel:								
Physicians	1	1	1	1	1, 2, 6	1	1	1
Nurses	1	1	1, 2	1	1	1	1	1
Sanitation personnel	1	1	1	1	1	1	1	1
Dentists and/or dental hygienists	-----	-----	-----	1	1, 6	-----	1	1
Laboratory personnel	1	1	1	-----	-----	1	1	-----
Others	-----	-----	-----	-----	-----	1	-----	1
Engages in postgraduate educational activities for private practitioners:								
Physicians	1	1	1	1	1, 6	1, 6	1	1
Nurses	-----	-----	-----	1	1, 6	1	-----	-----
Dentists	1	1	-----	1	-----	1, 6	1	-----
Others	-----	-----	-----	-----	-----	-----	-----	-----
Engages in health education activities for lay persons through:								
Group instruction	1	1	1	1	1	1	1	1
Radio	1	1	1	1	1	1	1	1
Bulletins	1	1	1	1	1	1	1	1
Exhibits	1	1	1	1	1	1	1	1
Press releases	1	1	1	1	1	1	1	1
Motion pictures	1	1	1	1	1	1	1	1
Employs special personnel for the editing and release of educational material	1	1	-----	1	1	1	1	1

See footnotes at end of table.

TABLE 1.—*Department of State government responsible for miscellaneous services affecting all branches of public health work in each State and Territory, the District of Columbia, and the Virgin Islands*—Continued

Activity	State or Territory							
	Florida	Georgia	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky
LICENSURE:								
Licenses members of the healing arts.								
Physicians	9	9	8	8	9	1, 9	9	1
Osteopaths	13	13	8	8	9	1, 13	13	1
Chiropractors	13	13	8	8	9	1, 13	13	13
Optometrists	13	13	8	8	13	1, 13	13	1
Nurses	10	10	8	8	10	10	10	10
Dentists	11	11	8	8	11	1, 11	11	11
Dental hygienists	-----	11	-----	-----	-----	1, 11	-----	-----
Pharmacists	12	12	8	8	12	12	12	12
Others	13	-----	-----	8	9	1, 13	13	-----
Licenses embalmers and/or funeral directors	13	13	8	8	13	1, 13	13	13
Licenses midwives (covered in chapter VII of this series).								
Licenses sanitation personnel: Plumbers, swimming pool operators, operators of water and sewage treatment plants (covered in chapter V of this series).								
Licenses barbers and beauticians (covered in chapter V of this series).								
Licenses hospitals and/or other health facilities (covered in chapters III, VI, and VII of this series).								

Activity	State or Territory							
	Louisiana	Maine [a]	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri
VITAL STATISTICS:								
Receives the following reports:								
Births	1	1	1	14	1	1	1	1
Deaths	1	1	1	14	1	1	1	1
Marriages	1	1	1	14	1	-----	1	-----
Divorces	1	-----	1	14	1	-----	1	-----
Morbidity reports (covered in chapters II, III, IV, VI, and VIII of this series).								
Analyzes the reports received	1	1	1	14	1	1	1	1
Allocates births and deaths to place of residence	1	1	1	14	-----	-----	1	-----
Furnishes other agencies and divisions with copies of reports or results of analyses:								
Routinely	1	-----	-----	14	1	1	1	-----
Upon request	1	1	1	14	1	1	1	1
Makes payments from State funds for vital statistics reports submitted by local registrars	-----	-----	-----	-----	-----	-----	-----	-----
Certifies for payment by local authorities vital statistics reports submitted by local registrars	1	1	1	14	1	1	1	1
LABORATORY SERVICES:								
Examines the following types of specimens:								
Venereal disease	1	1	1	1	1	1	1	1
Other communicable disease	1	1	1	1	1	1	1	1
Noncommunicable disease	1, 14	1	1	1	1, 6	[d] 6	1	1, [d] 14
Water samples	1	1	1	1	1	1	1, 7	[f] 1
Milk samples	1	1, 14	1	1	1	1, 3	1	1
Food and drug samples	1	1, 14	1	1	1, 3	3	7	1
Substances affecting industrial health	-----	-----	-----	5	1	1	-----	1
Engages in research activities	1	-----	1	1	1	1, 6	1	14
Manufactures biologicals distributed at State expense	1	-----	-----	1	1	1	1	-----
Operates branch laboratories	1	1	1	1	1	1	-----	-----
Distributes grants-in-aid to local laboratories	-----	-----	-----	-----	1	-----	1	-----
Maintains general supervision over private laboratories	-----	-----	-----	[h] 1	1	-----	-----	-----
Approves private laboratories for selected types of work only	1	-----	[g] 1	1	-----	[h] 1	-----	-----

See footnotes at end of table.

Table 1.—*Department of State government responsible for miscellaneous services affecting all branches of public health work in each State and Territory, the District of Columbia, and the Virgin Islands*—Continued

Activity	State or Territory							
	Louisiana	Maine	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri
HEALTH EDUCATION:								
Provides in-service training for public health personnel:								
Physicians	1	1	1	1	1	1	1	1
Nurses	1	1	1	1	1	1	1	1
Sanitation personnel	1, 6	1	1	1	1	1, 3, 6	1	1
Dentists and/or dental hygienists	------	------	1	1	1	1	1	1
Laboratory personnel	1	------	1	1	1	1	1	------
Others	------	------	------	------	------	6	1	------
Provides academic training for public health personnel:								
Physicians	1	1	1	1	1, 6	1	1	1
Nurses	1	1	1	1	1, 6	1	1	1
Sanitation personnel	1	1	------	1	1, 6	1	1	1
Dentists and/or dental hygienists	------	1	------	1	1, 6	------	1	------
Laboratory personnel	------	------	------	1	1, 6	1	1	1
Others	4	1	------	1	1, 6	------	1	1
Engages in postgraduate educational activities for private practitioners:								
Physicians	1, 6	1	1	1	1, 6	1, 6	1	1
Nurses	------	------	------	1	------	------	1	------
Dentists	------	1	1	1	1, 6	1	1	1
Others	------	------	------	------	------	------	------	------
Engages in health education activities for lay persons through:								
Group instruction	1	1	1	1	1	1	1	1
Radio	1	1	1	1	1	1	1	1
Bulletins	1	1	1	1	1	1	1	1
Exhibits	1	1	1	1	1	1	1	1
Press releases	1	------	1	1	1	1	1	1
Motion pictures	1	1	1	1, 4	1	1	1	1
Employs special personnel for the editing and release of educational material	------	------	1	------	1	1	1	1
LICENSURE:								
Licenses members of the healing arts:								
Physicians	9	9	9	8, 9	9	9	1	1
Osteopaths	13	13	13	8, 13	13	13	1	13
Chiropractors	----	13	13	------	13	13	------	13
Optometrists	13	13	13	8, 13	13	13	13	13
Nurses	10	10	10	8, 10	10	10	10	10
Dentists	11	11	11	8, 11	11	11	11	11
Dental hygienists	------	11	------	8, 11	11	11	11	----
Pharmacists	12	12	12	8, 12	12	12	12	12
Others	13	------	------	8, 13	------	9, 13	1	1
Licenses embalmers and/or funeral directors	13	13	13	8, 13	13	1	13	13
Licenses midwives (covered in chapter VII of this series).								
Licenses sanitation personnel: Plumbers, swimming pool operators, operators of water and sewage treatment plants (covered in chapter V of this series).								
Licenses barbers and beauticians (covered in chapter V of this series).								
Licenses hospitals and/or other health facilities (covered in chapters III, VI, and VII of this series).								

See footnotes at end of table.

TABLE 1.—*Department of State government responsible for miscellaneous services affecting all branches of public health work in each State and Territory, the District of Columbia, and the Virgin Islands*—Continued

Activity	State or Territory							
	Montana	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina
VITAL STATISTICS.								
Receives the following reports:								
Births	1	1	1	1	1	1	1	1
Deaths	1	1	1	1	1	1	1	1
Marriages		1	1	1	1		1	
Divorces		1		1	14			
Morbidity reports (covered in chapters II, III, IV, VI, and VIII of this series).								
Analyzes the reports received	1	1	1	1	1	1	1	1
Allocates births and deaths to place of residence	1			[d] 1	1	1	1	1
Furnishes other agencies and divisions with copies of reports or results of analyses:								
Routinely	1	1			1	1	1	1
Upon request	1	1	1	1	1	1	1	1
Makes payments from State funds for vital statistics reports submitted by local registrars			1					
Certifies for payment by local authorities vital statistics reports submitted by local registrars	1	1		1	1	1	1	1
LABORATORY SERVICES:								
Examines the following types of specimens:								
Venereal disease	1	1	1	1	1	1	1	1
Other communicable disease	1	1	1	1	1	1	1	1
Noncommunicable disease	1		1	1, 14		[d] 1	1	1
Water samples	1	1	1, 6	1	1	1	1	1
Milk samples	14	3	1, 6	1	1	1		
Food and drug samples	1	3	6	1	1	1	3	3
Substances affecting industrial health	1			1			5	1
Engages in research activities	1, 14				1	[d] 1	1, 5	
Manufactures biologicals distributed at State expense							1	1
Operates branch laboratories				1			1	
Distributes grants-in-aid to local laboratories	1				1		1	1
Maintains general supervision over private laboratories	1						1	
Approves private laboratories for selected types of work only					1			1
HEALTH EDUCATION:								
Provides in-service training for public health personnel								
Physicians		1			1	1	1	1
Nurses	1, 2	1	1	1	1	1	1	1
Sanitation personnel	1, 3, 14	3	1	1		1	1	1
Dentists and/or dental hygienists							1	1
Laboratory personnel	1	1			1		1	
Others	1					1	1	
Provides academic training for public health personnel:								
Physicians		1	1	1	1	1	1	1
Nurses	1	1	1	1		1	1	1
Sanitation personnel	1	1		1	1			1
Dentists and/or dental hygienists								
Laboratory personnel	1		1	1	1	1		1
Others			1	1	7		1	
Engages in postgraduate educational activities for private practitioners.								
Physicians	1	1	1	1	1	1	1	1
Nurses	1						1	1
Dentists	1	1	1				1	1
Others								
Engages in health education activities for lay persons through:								
Group instruction	1	1	1	1	1	1	1	1
Radio	1	1	1	1	1	1	1	1
Bulletins	1	1	1	1	1	1	1	1
Exhibits	1	1	1	1	1	1	1	1
Press releases	1				1	1	1	1
Motion pictures	1	1	1	1	1	1	1	1
Employs special personnel for the editing and release of educational material							1	

505162°—43——2

TABLE 1.—*Department of State government responsible for miscellaneous services affecting all branches of public health work in each State and Territory, the District of Columbia, and the Virgin Islands*—Continued

Activity	State or Territory							
	Montana	Nebraska	Nevada	New Hampshire	New Jersey	New Mexico	New York	North Carolina
LICENSURE:								
Licenses members of the healing arts:								
Physicians	9	1	9	9	9	9	4	9
Osteopaths	13	1	13	9	9	13	4	13
Chiropractors	13	1	13	13	9	13	------	13
Optometrists	13	1	13	13	13	13	4	13
Nurses	10	4, 10	10	4	10	10	4	10
Dentists	11	1	11	11	11	11	4	11
Dental hygienists	11	------	------	11	------	------	4	------
Pharmacists	12	1	12	12	12	12	4	12
Others	------	1	------	------	9	13	4	13
Licenses embalmers and/or funeral directors	13	1	13	13	13	13	1	13
Licenses midwives (covered in chapter VII of this series).								
Licenses sanitation personnel: Plumbers, swimming pool operators, operators of water and sewage treatment plants (covered in chapter V of this series).								
Licenses barbers and beauticians (covered in chapter V of this series).								
Licenses hospitals and/or other health facilities (covered in chapters III, VI, and VII of this series).								

Activity	State or Territory							
	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota
VITAL STATISTICS:								
Receives the following reports:								
Births	1	1	1	1	1	1	1	1
Deaths	1	1	1	1	1	1	1	1
Marriages	1	------	------	1	1	1	------	1
Divorces	------	------	------	1	------	1	------	1
Morbidity reports (covered in chapters II, III, IV, VI, and VIII of this series).								
Analyzes the reports received	1	1	1	1	1	1	1	1
Allocates births and deaths to place of residence	1	1	1	1	1	1	------	1
Furnishes other agencies and divisions with copies of reports or results of analyses:								
Routinely	1	------	1	1	1	1	------	1
Upon request	1	------	1	1	1	1	1	1
Makes payments from State funds for vital statistics reports submitted by local registrars	------	------	1	------	------	------	------	------
Certifies for payment by local authorities vital statistics reports submitted by local registrars	1	1	------	1	1	1	1	1
LABORATORY SERVICES:								
Examines the following types of specimens:								
Venereal disease	1	1	1	[d] 1	1	1	1	1, 6
Other communicable disease	1	1	1	1	1	1	1	1, 6
Noncommunicable disease	1	[d] 6	1	6	1	1	1	1, 6
Water samples	1, 7	1	1	1, 6	1	1	1	1, 6
Milk samples	1, 7	1	1	1, 3	1	1, 3	1	1, 3, 6
Food and drug samples	7	1, 3	1	3	1, 3, 12	1	------	6
Substances affecting industrial health	------	1	1	------	1, 5	1	1	------
Engages in research activities	------	1	[d] 1	1, 6	1, 6	1	1	------
Manufactures biologicals distributed at State expense	------	1	1	------	------	------	1	------

See footnotes at end of table.

TABLE 1.—*Department of State government responsible for miscellaneous services affecting all branches of public health work in each State and Territory, the District of Columbia, and the Virgin Islands*—Continued

Activity	North Dakota	Ohio	Oklahoma	Oregon	Pennsylvania	Rhode Island	South Carolina	South Dakota
	State or Territory							
LABORATORY SERVICES—Continued.								
Operates branch laboratories	1	------	1	------	1	1	------	1, 6
Distributes grants-in-aid to local laboratories	------	1	------	1	------	------	------	------
Maintains general supervision over private laboratories	------	[d] 1	[h] 1	------	------	------	------	------
Approves private laboratories for selected types of work only	------	------	------	1	1, 6	1	------	1
HEALTH EDUCATION:								
Provides in-service training for public health personnel:								
Physicians	------	------	1	1	1	1	1	1
Nurses	1	1	1	1	1	1	1	1
Sanitation personnel	1	1, 3	1	1, 3	1	1	1	1
Dentists and/or dental hygienists	1	------	1	------	1	------	1	------
Laboratory personnel	1	------	1	------	------	1	1	1
Others	------	1	1	------	1	------	------	------
Provides academic training for public health personnel.								
Physicians	1	1	1	1	1, 6	------	1	1
Nurses	1	1	1	1	1, 6	------	1	1
Sanitation personnel	1	1	1	1	1, 6	------	1	1
Dentists and/or dental hygienists	------	------	1	1	------	------	1	------
Laboratory personnel	1	------	------	1	------	1	------	------
Others	1	------	------	1	1, 6	------	------	------
Engages in postgraduate educational activities for private practitioners								
Physicians	1	------	1	------	1	1	1	1
Nurses	------	1	------	1	------	------	------	------
Dentists	1	1	1	1	1	------	1	------
Others	------	------	------	------	------	------	------	------
Engages in health education activities for lay persons through								
Group instruction	1	1	1	1, 4	1	1	1	1
Radio	1	------	1	1, 4	1	1	1	1
Bulletins	1	1	1	1, 4	1	1	1	1
Exhibits	1	1	1	1, 4	1	1	1	1
Press releases	1	------	1	------	1	1	1	1
Motion pictures	1	1	1	1, 4	1	1	1	------
Employs special personnel for the editing and release of educational material	------	------	1	1, 4	1	------	------	------
LICENSURE:								
Licenses members of the healing arts:								
Physicians	9	9	9	9	4, 9	1	9	1
Osteopaths	13	9	13	13	4, 13	1	13	13
Chiropractors	13	9	13	13	4, 9	1	13	13
Optometrists	13	13	13	13	4, 13	1	13	13
Nurses	10	9	10	10	4, 10	1	10	10
Dentists	11	11	11	11	4, 11	1	11	11
Dental hygienists	------	11	11	------	4, 11	1	------	11
Pharmacists	12	12	12	12	4, 12	1	12	12
Others	13	9	13	13	4, 9	1	13	13
Licenses embalmers and/or funeral directors	1	13	13	13	1, 4, 13	1	13	13
Licenses midwives (covered in chapter VII of this series)								
Licenses sanitation personnel: Plumbers, swimming pool operators, operators of water and sewage treatment plants (covered in chapter V of this series).								
Licenses barbers and beauticians (covered in chapter V of this series).								
Licenses hospitals and/or other health facilities (covered in chapters III, VI, and VII of this series).								

See footnotes at end of table.

TABLE 1.—*Department of State government responsible for miscellaneous services affecting all branches of public health work in each State and Territory, the District of Columbia, and the Virgin Islands*—Continued

Activity	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin
	State or Territory							
VITAL STATISTICS:								
Receives the following reports:								
Births	1	1	1	1	1	1	1	1
Deaths	1	1	1	1	1	1	1	1
Marriages	----	----	----	1	1	----	1	1
Divorces	----	----	----	1	1	----	----	1
Morbidity reports (covered in chapters II, III, IV, VI, and VIII of this series).								
Analyzes the reports received	1	1	1	1	1	1	1	1
Allocates births and deaths to place of residence	1	----	1	----	1	1	[b] 1	1
Furnishes other agencies and divisions with copies of reports or results of analyses:								
Routinely	----	1	1	----	1	1	1	1
Upon request	1	1	1	1	1	1	1	1
Makes payments from State funds for vital statistics reports submitted by local registrars	----	----	----	----	----	----	----	----
Certifies for payment by local authorities vital statistics reports submitted by local registrars	1	1	1	1	1	1	1	1
LABORATORY SERVICES:								
Examines the following types of specimens:								
Venereal disease	1	1	1	1	1, [e] 6	1	1	1, 7
Other communicable disease	1	1	1	1	1	1	1	1, 6
Noncommunicable disease	1	1	1	6, 14	[d] 1	----	1	1, 6
Water samples	1	1	1	1	1	1	1	1, 6
Milk samples	1	1	7	1, 3	1, 3	1, 7	1	1, 3, 6
Food and drug samples	3	1	7	1	1, 3	7	[g] 1	3
Substances affecting industrial health	----	1	1	1	1	5	1	1
Engages in research activities	----	1	----	----	1	----	1	1, 6
Manufactures biologicals distributed at State expense	1	1	1	----	----	----	1	1, 6
Operates branch laboratories	1	----	1	----	1	----	----	1
Distributes grants-in-aid to local laboratories	----	1	----	----	----	1	----	1
Maintains general supervision over private laboratories	----	----	----	----	----	----	----	----
Approves private laboratories for selected types of work only	----	----	----	----	1	1	1	1, 6
HEALTH EDUCATION:								
Provides in-service training for public health personnel.								
Physicians	1	1	1	1	1	1	1	----
Nurses	1	1	1	1	1	1	1, 2	1
Sanitation personnel	1, 3, 6	1	1	1	----	1	1	1, 3
Dentists and/or dental hygienists	1	1	----	----	1	----	----	----
Laboratory personnel	1	1	1	----	1	----	----	1, 6
Others	1	1	----	----	----	1	----	----
Provides academic training for public health personnel:								
Physicians	1	1	1	1	1	1	1	1
Nurses	1	1	1	1	1	1	1	1
Sanitation personnel	1	1	1	1	1	1	1	1
Dentists and/or dental hygienists	1	1	----	1	----	----	----	----
Laboratory personnel	1	1	1	----	1	----	----	----
Others	1, 6	1	1	----	----	----	----	1
Engages in postgraduate educational activities for private practitioners:								
Physicians	1, 6	1	1	1	1, 6	1	1	1
Nurses	----	----	----	----	----	----	----	----
Dentists	1	----	1	1	----	----	----	1
Others	----	----	----	----	----	----	----	----
Engages in health education activities for lay persons through:								
Group instruction	1, 4, 6	1	1	1	1, 4	1	1	1
Radio	1	1	1	1	1	1	1	1
Bulletins	1	1	1	1	1, 4	1	1	1
Exhibits	1, 6	1	1	1	1	1	1	1
Press releases	1	1	1	1	1	1	1	1
Motion pictures	1	1	1	1	1	1	1	1
Employs special personnel for the editing and release of educational material	1, 4, 6	1	----	----	1	----	1	----
LICENSURE:								
Licenses members of the healing arts:								
Physicians	9	9	8	9	9	8	1	9
Osteopaths	13	9	8	13	----	8	13	9

See footnotes at end of table.

TABLE 1.—*Department of State government responsible for miscellaneous services affecting all branches of public health work in each State and Territory, the District of Columbia, and the Virgin Islands*—Continued

Activity	State or Territory							
	Tennessee	Texas	Utah	Vermont	Virginia	Washington	West Virginia	Wisconsin
LICENSURE—Continued.								
Licenses members of the healing arts—Con.								
Chiropractors	13	-----	8	13	-----	8	13	13
Optometrists	13	13	8	13	13	8	13	13
Nurses	10	10	8	10	10	8	10	1, 10
Dentists	11	11	8	11	11	8	11	11
Dental hygienists	11	-----	-----	11	-----	8	11	11
Pharmacists	12	12	8	12	12	12	12	12
Others	13	13	8	-----	-----	8	-----	-----
Licenses embalmers and/or funeral directors	13	13	8	13	13	8	13	1, 13
Licenses midwives (covered in chapter VII of this series).								
Licenses sanitation personnel: Plumbers, swimming pool operators, operators of water and sewage treatment plants (covered in chapter V of this series).								
Licenses hospitals and/or other health facilities (covered in chapters III, VI, and VII of this series)								

Activity	State or Territory				
	Wyoming	Alaska	Hawaii	Puerto Rico	Virgin Islands
VITAL STATISTICS:					
Receives the following reports:					
Births	1	14	1	1	1
Deaths	1	14	1	1	1
Marriages	-----	14	1	1	-----
Divorces	-----	-----	-----	1	-----
Morbidity reports (covered in chapters II, III, IV, VI, and VIII of this series).					
Analyzes the reports received	1	14	1	1	1
Allocates births and deaths to place of residence	1	-----	1	[b] 1	-----
Furnishes other agencies and divisions with copies of reports or results of analyses:					
Routinely	1	14	1	-----	1
Upon request	1	14	1	1	1
Makes payments from State funds for vital statistics reports submitted by local registrars	-----	-----	-----	1	-----
Certifies for payment by local authorities vital statistics reports submitted by local registrars	1	14	-----	-----	-----
LABORATORY SERVICES:					
Examines the following types of specimens:					
Venereal disease	1	1	1	1	1
Other communicable disease	1	1	1	1	1
Noncommunicable disease	-----	1	1	1	1
Water samples	1	1	1	1	1
Milk samples	1, 7	1	1	1	-----
Food and drug samples	-----	-----	1	1	-----
Substances affecting industrial health	-----	-----	1	-----	-----
Engages in research activities	-----	-----	-----	1	-----
Manufactures biologicals distributed at State expense	1	-----	-----	-----	-----
Operates branch laboratories	-----	-----	1	1	-----
Distributes grants-in-aid to local laboratories	-----	-----	-----	-----	-----
Maintains general supervision over private laboratories	-----	-----	-----	-----	-----
Approves private laboratories for selected types of work only	-----	-----	-----	-----	-----
HEALTH EDUCATION:					
Provides in-service training for public health personnel:					
Physicians	1	-----	-----	1	-----
Nurses	1	1	1	1	1
Sanitation personnel	1	-----	-----	1	1
Dentists and/or dental hygienists	1	-----	-----	-----	-----
Laboratory personnel	-----	-----	-----	1	1
Others	-----	-----	-----	-----	-----

See footnotes at end of table.

TABLE 1.—*Department of State government responsible for miscellaneous services affecting all branches of public health work in each State and Territory, the District of Columbia, and the Virgin Islands*—Continued

Activity	State or Territory				
	Wyoming	Alaska	Hawaii	Puerto Rico	Virgin Islands
HEALTH EDUCATION—Continued.					
Provides academic training for public health personnel:					
Physicians	1	1	1	1	[d] 1
Nurses	1	1	1	1	--------
Sanitation personnel	1	--------	1	1	--------
Dentists and/or dental hygienists	1	--------	--------	--------	--------
Laboratory personnel	--------	1	1	1	--------
Others	-	--------	1	--------	--------
Engages in postgraduate educational activities for private practitioners:					
Physicians	1	1	1	1	--------
Nurses	--------	--------	--------	--------	--------
Dentists	--------	--------	--------	--------	--------
Others	--------	--------	--------	--------	--------
Engages in health education activities for lay persons through:					
Group instruction	1, 4	1	1, 4	1	1
Radio	--------	1	1, 4	1	--------
Bulletins	1, 4	1	1, 4	1	1
Exhibits	1, 4	1	1, 4	1	1
Press releases	--------	--------	1	1	1
Motion pictures	1	1	1	1	--------
Employs special personnel for the editing and release of educational material	1, 4	--------	1, 4	1	--------
LICENSURE:					
Licenses members of the healing arts:					
Physicians	9	9	9	9	9
Osteopaths	9	14	13	9	--------
Chiropractors	13	13	13	--------	--------
Optometrists	13	13	13	--------	--------
Nurses	10	--------	10	9	10
Dentists	11	11	11	11	9
Dental hygienists	--------	--------	11	--------	--------
Pharmacists	12	12	12	12	9
Others	--------	--------	1, 13	--------	--------
Licenses embalmers and/or funeral directors	13	14	1	1	--------
Licenses midwives (covered in chapter VII of this series).					
Licenses sanitation personnel: Plumbers, swimming-pool operators, operators of water and sewage treatment plants (covered in chapter V of this series).					
Licenses barbers and beauticians (covered in chapter V of this series).					
Licenses hospitals and/or other health facilities (covered in chapters III, VI, and VII of this series).					

* Code:
1. Health department
2. Department of welfare
3. Department of agriculture
4. Department of education
5. Department of labor
6. State university or college
7. Independent State laboratory, State laboratory department, State chemist, State toxicologist
8. Department of civil service and registration, department of registration and education, department of law enforcement, commission on licensure
9. Board of medical examiners
10. Board of nursing examiners
11. Board of dental examiners
12. Board of pharmacy
13. Other independent licensing or examining boards established specifically for control of the professional group indicated
14. Other departments of State government

**Any differences between information presented in this table and corresponding entries in previous chapters of this series are the result of combining several activities originally shown separately or of further refinement of the data since publication of the earlier articles.

[a] The department of health is really a division (Idaho) and bureau (Maine) of public health, subordinate to the department of public welfare (Idaho) and the department of health and welfare (Maine).

[b] Within the State only.

[c] Within the State only for births; both within and without the State for deaths.

[d] To a limited extent or under certain conditions only—for selected areas, selected cases, etc.

[e] Two agencies of this classification function in this manner.

[f] Service provided, but on a fee basis.

[g] Has authority, but little is done.

[h] On a voluntary basis.

VITAL STATISTICS

Improvement in the collection and preservation of vital statistics (records of births and deaths and—in some instances—of marriages and divorces) has been stimulated by the United States Bureau of the Census over a period of years. As early as 1880 a registration area for deaths was established, with two States and the District of Columbia qualifying for membership. The registration area for births was initiated in 1915. Requirements for admission to these areas were based upon satisfactory State vital statistics laws and 90 percent completeness of reporting, as shown by special applied tests. In 1940, all 48 States, the District of Columbia, Hawaii, and the Virgin Islands had been admitted to both the death and birth registration areas. Puerto Rico belonged to the death registration area only, and Alaska had not qualified for admission to either.

In addition to supplying valuable information concerning population trends, complete files of vital statistics records constitute a valuable reservoir of information which may be drawn upon to supply the answers to numerous related questions, many of which are significant in the field of health. Then too, from such files may be made transcripts of birth and death certificates which are constantly in demand for verification of age or of citizenship or for collection of death benefits.

All but two of the 53 jurisdictions delegate collection and processing of vital statistics to the State health department, and most of them specifically designate by statute that the State health officer shall be registrar of vital statistics for the State. Massachusetts and Alaska are the two exceptions; the secretary of State and the Territorial auditor, respectively, are the governmental units responsible. In view of such striking agreement among the States as to the agency officially in charge of assembling and interpreting vital statistics data, it might be expected that a uniform procedure would be followed in the items recorded and in the State set-up for collecting vital statistics, that a common type of analysis would be made by the several vital statistics units, and that consistent arrangements for supplying copies of birth and death certificates would be agreed upon. On the contrary, marked individuality characterizes State plans for administering vital statistics services.

While reports of births and deaths are received by all States, marriages are reported to the State agency in but 32 jurisdictions, and divorces in only 20. In all States, the collection of vital statistics records is accomplished through local registrars functioning in local registration districts. These local registrars receive reports of births and deaths directly from attending physicians, midwives, undertakers,

or other informants. The basis upon which local registration districts are formed and the method by which local registrars are appointed are prescribed by State law. For the most part, political subdivisions of a county constitute the basis for establishing local vital statistics registration districts. Cities, villages, towns, townships, election districts, magisterial districts, or similar minor civil divisions form the local registration areas in 42 States. In the remaining States, geographic rather than political characteristics are the factors which determine the boundaries of local registration districts. Convenience of communication, transportation facilities, and mail service are items usually considered under this plan. There is even greater variation with respect to the method of appointing local registrars. In over two-fifths of the States, either the State board of health, the State health officer, or the director of the bureau of vital statistics makes the appointments; in a dozen more, they are appointed locally by the board of county commissioners, the local health officer, the board of town trustees, the mayor, or board of aldermen; in 10 States the duties of city or town clerk or of local health officer automatically include the collection of vital statistics; while in the remaining half dozen States, the office is elective—by popular vote of the community.

Another administrative item regarding which there is diversity of policy is the promptness with which vital statistics reports must be filed with local registrars and forwarded by them to the State. The period allowed physicians and midwives for reporting births to the local registrar ranges from 3 to 15 days, with 10 days being the time most frequently given. For deaths, anywhere from 24 hours to 10 days is set as the limit, but 72 hours, or "before burial," represents the most usual requirement. With but few exceptions, birth and death certificates are forwarded to the State office at monthly intervals. In several States they must be in by the fourth day of the succeeding month; in others, 15 or 20 days are allowed. Generally, however, the tenth day marks the limit.

Finally, the means and amount of reimbursement for local registrars is a subject of disagreement. In general, where vital statistics registrars hold their positions by an ex officio arrangement, the salary which they draw by virtue of their major office also covers their efforts as vital statistics collectors. Persons who function solely as local registrars are usually recompensed on a fee rather than a salary basis. The size of fee ranges from 10 cents to over $1 for each birth and death certificate submitted to the State, with 25 cents the figure most commonly reported. In a few jurisdictions only half-price is paid for delayed certificates, while in others a flat monthly bonus is paid for prompt reporting; in still others, the rate for birth certificates is double that for certificates of death. Occasionally, payments for this service are made by the State agency from State

funds. The more customary procedure is that whereby the State agency certifies the amount to which each local registrar is entitled, and payment is made by the respective counties or cities.

States differ to a lesser extent in the use which they make of the vital statistics data collected. Each bureau or division of vital statistics functions primarily as a service unit, the foremost concern of which is to file and preserve the original records entrusted thereto and to supply certified copies of birth and death records to individuals requesting such information. More recently, proof of age and place of birth has been required for an increasing number of purposes. Outstanding among these are verification of age for a child to enter school; for the right to vote, to marry, or to inherit; for work permits in connection with enforcement of laws against employing minors in certain occupations; for government employment under the civil service system or in war industries; for induction into the military service; and for securing Federal benefits such as social security grants. Requests for copies of death and marriage records are made less frequently, but the State agency supplies them as called for. Hundreds and, in some cases, even thousands of copies of vital statistics records are issued each year by State bureaus or divisions of vital statistics. Charges for such service vary from 25 cents to $1 per copy. Another routine performance of all State vital statistics units is the furnishing of transcripts of all birth, death, and stillbirth certificates to the United States Bureau of the Census each month and the monthly and annual compiling of certain tabulations for the United States Public Health Service.

Beyond these common services, all States make certain types of analyses of the gross body of vital statistics data which they have gathered. The detail of such analyses depends, to a large extent, upon the size of staff and mechanical equipment available for study purposes.

By measuring death rates from different causes, the progress of health programs directed toward reduction of particular diseases or conditions can be evaluated. Likewise, situations requiring intensified control are disclosed. All States routinely tabulate deaths by cause, and nearly all of them make age, race, sex, and locality classifications. Three-fourths of the States in determining death rates by locality correct the place of death to actual place of residence. In addition to making ordinary tabulations, which are furnished to an established list of recipients by almost 75 percent of the jurisdictions, most States are prepared to supply—upon request—special statistical reports to official and nonofficial agencies having particular health interests. Routine referral of limited information upon receipt thereof is made by about a third of the State bureaus of vital statistics to

interested official and voluntary agencies. For example, in some States it is routine practice to furnish the division of tuberculosis with descriptive information (age, sex, race, etc.) of persons dying of tuberculosis; in others, reports of maternity and infant deaths are referred automatically to the division of maternity and child health; still others regularly notify the division of epidemiology of deaths from the various communicable diseases. A number of crippled children's divisions, likewise, periodically receive reports of births with congenital deformities, while the State department of motor vehicles and the National Safety Council are frequent recipients of information concerning accidental deaths.

Unfortunately, according to statements made by some State personnel engaged in vital statistics work, the material available from their files is not always utilized fully by division directors responsible for program planning. Furthermore, the increased demand for copies of birth records has necessitated curtailment of analytical procedures. As a result of these combined circumstances, few States go beyond their primary duty of collecting and preserving records and preparing more or less standard tabulations.

LABORATORY SERVICES

Public health laboratories are maintained by the State for three major purposes. First, they make available to physicians, hospitals, and public health personnel diagnostic facilities which would otherwise be unavailable. Second, certain biologicals to be distributed for preventive or therapeutic purposes are prepared therein. Third, the personnel of such laboratories act in a supervisory capacity with regard to practices and procedures of private laboratories. Availability of State laboratory service for specific purposes has already received some consideration in previous articles of this series.[3] At the same time, these scattered references give no complete or coherent picture of State organization for making all types of laboratory tests that may be required for the administration of a balanced health program.

To a varying extent, and under divergent circumstances, provision of laboratory service for the diagnosis of communicable and—in some instances—noncommunicable diseases, for the analysis of drinking water, milk, foods, and drugs, and for determination of the presence and concentration of toxic substances in industrial establishments is recognized as a responsibility of State government. Although all branches of laboratory service listed have public health significance, there is conspicuous difference in identity of the State agency responsible for the provision of each.

[3] See text footnote [2].

Except in Arizona, where the entire State laboratory is administered as an independent agency, and in Wisconsin, where tests for venereal diseases are made by the Psychiatric Institute, the State health department—either independently, or cooperatively with the State university—maintains facilities for diagnosis of all communicable illnesses, including tuberculosis and the venereal diseases. No effort was made in this study to elicit information as to the individual procedures followed in arriving at positive or negative findings or of the verification measures employed. Of particular interest was the disclosure that, for the country as a whole, serologic tests for syphilis represent approximately two-thirds of the entire diagnostic laboratory work of State health departments for all communicable diseases. In only 7 States did this proportion fall below 50 percent of the total work done for transmissible illnesses. Recently enacted premarital examination laws and laws requiring serological tests for expectant mothers are believed to be partially responsible for this concentration of activity in State health department laboratories. Further explanation, no doubt, lies in the fact that many of the simpler diagnostic tests may be performed locally, while fewer of the local units are equipped to do serology.

Aid in the diagnosis of noncommunicable illnesses, when given by the State, is also a function of the health department laboratory, though a number of State hospitals administered by universities, cancer commissions, and independent boards of trustees are likewise active in this field—particularly with respect to tissue examinations for diagnosis of cancer. Even so, laboratory service for diagnosis of noncommunicable conditions is provided by the State far less commonly than is diagnostic service for transmissible diseases. As a matter of fact, only 20 health departments routinely make blood counts, 28 do urinalyses as part of their regularly scheduled work, and 14 reported tissue examinations—which in some instances are limited to cancer. All specimens for diagnosis of human illness must be submitted to the State laboratory by physicians, hospitals, or public health personnel. In about half of the States where laboratories other than those of the health department operate, service is available only to patients of the respective hospitals.

Another important function of State health department laboratories is the bacteriological and chemical analysis of samples of drinking water. The water laboratory may be a part of the diagnostic laboratory or it may be operated separately by the division of sanitary engineering. Water samples are collected periodically from public supplies, but samples from private supplies are usually tested only upon request of a local physician, public health worker, or private citizen. It is more customary for the State agency to charge a fee for water analysis than for any other type of laboratory service.

In addition to health department activity, several State universities—either independently, or cooperatively with the health department—also make analyses of drinking water.

State facilities for bacteriological and chemical analysis of milk, foods, and drugs are scattered among more different agencies of State government than are facilities for diagnosis of disease and determination of the safety of drinking water. This observation is supported by the fact that 3 departments of agriculture are exclusively responsible for milk testing, and 12 for food and drug analyses, whereas 8 and 4 more, respectively, share such duties with State health departments. Besides the departments of agriculture referred to, independent State laboratories or laboratory departments, State chemists, agricultural experiment stations, livestock sanitary boards, public service divisions of State universities, or boards of pharmacy—totaling nearly a dozen in all—likewise analyze milk, foods, and drugs from standpoints which are significant to public health. It is worthy of mention, perhaps, that in 5 jurisdictions no State agency makes either bacteriological or chemical analysis of milk, and in an equal number analysis of foods and drugs is not considered a State responsibility.

Laboratory service for determination of the presence and concentration of dusts, gases, fumes, and other toxic substances injurious to the health of industrial workers is afforded by 30 of the jurisdictions covered by this study. In 25 States, the health department performs all of the tests related to industrial hygiene; in 3, the department of labor functions in this capacity; and in the remaining 2, the departments of health and labor share responsibility for laboratory procedures significant to industrial health.

In addition to performing the routine laboratory services described, public health laboratories of over three-fifths of the States carry on some form of bacteriological and/or chemical research which is related to specific health problems. As a rule, the research activities are conducted on a parallel plane with the regular services rather than set up as separate projects operated by personnel assigned especially for that purpose. Upon occasion, however, certain funds are designated for particular types of research and selected personnel devote their entire time to this purpose. Foremost consideration is given to improvement of the methods used and to comparison of advocated new methods with present techniques. Outstanding among such research, from the point of view of emphasis, is the improvement of diagnostic tests for syphilis. Extensive work is done also in the fields of influenza, typhoid fever, rabies, pneumonia, diphtheria, poliomyelitis, tularemia, food poisoning, and water and milk sanitation.

About half of the State health department laboratories manufacture at least some portion of the biologicals or other materials which are distributed for preventive or therapeutic purposes. Typhoid fever

vaccine and silver nitrate are the materials most often prepared in the laboratories of State health departments, although the manufacture of rabies vaccine and of diphtheria toxoid and toxin for Schick tests was reported by more than a half dozen States each. Smallpox vaccine, whooping cough serum, scarlet fever antitoxin, dilutions of tuberculin, pneumonia serum, antimeningitis serum, tetanus antitoxin, and convalescent serum for poliomyelitis are other types of biologicals occasionally manufactured by State-operated laboratories.

In order that accessibility of the State laboratory facilities and services described might be assured to a maximum proportion of the State's inhabitants, more than half of the State health departments have established branches of their main laboratories at various strategic points. Some States have discontinued operation of branch laboratories and emphasize development of local public health laboratories. Seventeen States, either through employment of personnel or purchase of equipment, subsidize public health laboratories operated by local health departments. Payment of fees by State agencies to local laboratories is not a customary procedure for service of any type. Wherever local health units maintain laboratories of their own, the demand upon State facilities is considerably reduced, of course.

State control of techniques employed by private laboratories has been intensified with the increase in serologic work occasioned by recently enacted legislation requiring blood tests before marriage and during pregnancy. In 16 States it is mandatory that the performance of private laboratories engaged in making serologic tests be checked and approved by the director of the State laboratory or his representative. Nine jurisdictions extend State supervision over private laboratories to include all types of diagnostic tests having public health significance. In several States, although no regulatory duties are imposed upon personnel of the official health laboratory, State approval is sought as a mark of recognition. As a general rule, the director and his staff are available for consultation and advice to private laboratories upon request.

HEALTH EDUCATION

The two major objectives in the field of health education may be classified as extension of training for professional personnel and dissemination of health information for the general public. All States recognize the importance of having well-trained professional staff members. Unfortunately, however, it is sometimes necessary for both State and local health departments to employ personnel who have not had adequate specialized training. When such personnel are basically satisfactory in other respects, most State health departments arrange to give them a leave of absence and to bear a considerable portion of the expense of providing additional training for them

in accredited schools. To a large extent, State health departments finance the formal postgraduate training of public health personnel through funds made available by Federal grants-in-aid. Consequently, certain stipulations of the Federal agencies which make the grants must be satisfied in the selection of persons for training and in the length of courses offered. Within these limitations, the number and duration of special training courses vary in accordance with the needs of the employee and the interest and attitudes of the several States. Training funds may be devoted to tuition, stipends, and/or travel expenses of the selected personnel attached to both State and local health department staffs.

During 1940, nearly every State provided intramural training for one or more public health nurses and physicians, the latter group including health officers, division directors, and other medical personnel. In all except 7 States, sanitation personnel—engineers, sanitarians, food and milk inspectors, and the like—received some sort of academic training at State expense, but the number of sanitation personnel who were trained was relatively low. Special courses were arranged for laboratory workers by scarcely more than half of the States. Even less frequently were staff dentists given postgraduate training, since but 35 percent of the States listed members of this profession among their 1940 trainees.

Explanations of the differences in size and composition of trainee groups are determined by several circumstances. Since a full year of postgraduate work is the maximum training period allowed for a single individual, departments having a high turn-over among their staff members naturally find it necessary to train more employees than do those where there is greater stabilization of employment. Moreover, according to Seger and Dance,[4] who have analyzed records of individuals trained with Federal funds over a period of several years, "The high proportion of physician trainees in relation to the proportion of physicians employed in health departments probably reflects the desire of State health officers to emphasize the training of employees in major administrative and clinical positions. The relatively high proportion of applications from nurses may perhaps be attributed to the rapid turn-over in nursing positions as well as to the importance attached to postgraduate training by professional nursing associations. The proportion of applications from sanitation personnel, on the other hand, is relatively low. This may be due in part to lack of appreciation by public health administrators of the advantages of training this class of personnel. Undoubtedly an additional factor, however, is the fact

[4] Seger, Gordon H., and Dance, Darrell A. A study of the professional training program for public health personnel under title VI of the Social Security Act and the Federal Venereal Disease Control Act for the fiscal years 1936 to 1940 inclusive. Unpublished data.

that many sanitarians, exclusive of engineers, do not possess the educational qualifications required for matriculation in a graduate school of public health; hence their training was of the informal type." Additional education provided for sanitation personnel, therefore, is more apt to be given through in-service than through academic training. The fewness of laboratory technicians given postgraduate training may be ascribed to the fact that their basic instruction involves a higher degree of specialization than does the broader fundamental training of nurses and physicians. Personnel classified as "Other" in this section of table 1 include, for the most part, health educators and statisticians.

Continuation of training for public health workers is not confined to the relatively small number of employees who temporarily are relieved from duty to receive formal instruction. Programs of in-service training such as institutes, regional conferences, home study courses, or field demonstrations are conducted by all State health departments, a few departments of welfare and agriculture, and nearly a dozen State universities. By such devices active public health personnel are kept informed of newly developed techniques and administrative procedures and an opportunity is afforded for the various workers to present individual problems for group discussions and suggestions. Nurses, physicians, and sanitation personnel appear to be the most common recipients of informal, as well as formal, staff education.

Private practitioners in the fields of medicine, dentistry, and nursing are not overlooked in the plans of most States for postgraduate education of professional groups. Educational measures for private practitioners usually take the form of periodic lectures, seminars, refresher courses, conferences, or short continuation courses at selected universities. Distribution of literature pertaining to specific health problems is also followed quite extensively. Activities of an educational nature have been focused more sharply upon private physicians than upon either dentists or nurses engaged in private practice, and refresher courses for private dentists outnumber those for nurses. Even among the physicians there has been marked selectivity. Those engaged in obstetrics, pediatrics, and in the diagnosis and treatment of venereal diseases, tuberculosis, pneumonia, and cancer receive particular attention in these programs. For the most part, educational pursuits for private practitioners are carried on in conjunction with the various programs dealing with specific health activities of health departments and not as an undertaking for general purposes.

Under this same administrative set-up a certain amount of information for popular consumption is disseminated also. Earlier chapters of this series [5] have demonstrated the fact that educational

[5] See text footnote[2].

activities form an integral part of practically every public health program, for it is recognized quite generally that only through public understanding of proven prophylactic and therapeutic measures can their adoption be assured.

In addition to the separate educational undertakings of specialists in the several branches of public health endeavor, about half of the States operate a central system of releasing instructive health material. These general measures are aimed at promoting interest in and knowledge of the breadth of the complete health scene. Through their offices the mutual relationship of the several specialties is clarified and the numerous objectives and methods are presented as essential parts of a unified whole. In other words, the unit of health education serves as the publicity department for the entire health agency.

For the most part, States employing personnel who devote their efforts exclusively to health education maintain a systematic calendar for presenting certain phases of health work at designated times. Such schedules are sufficiently flexible to allow the filling of special requests to take precedence of routine presentations. In addition to preparing original educational materials such as regular or sporadic newspaper releases, magazine articles, bulletins and pamphlets, radio scripts, exhibits, department periodicals, and speeches, the health educator assembles and distributes materials available from other sources. Not only are these materials used by various staff members of the State agency, but they are also loaned, upon request, to local health departments or to lay groups interested in particular health problems. For example, a number of departments maintain film libraries and circulate their motion pictures throughout the State for showing by local groups.

It is not to be construed that use of the aforementioned educational methods is restricted to health departments employing full-time health educators, for in States without divisions of health education, directors of the various health specialties utilize similar devices. However, in the States having health educators, physicians and nurses are relieved of many publicity duties which they otherwise have to perform. While it appears that the position of health educator is becoming increasingly prominent on the health department staff, no agreement has been reached among the States as to the kind of training a person serving in this capacity should have. In one State, selection is made on the basis of the candidate's qualifications as a teacher; in another, writing ability and experience are the prime requisites; in a third, maintenance of satisfactory contacts with legislative groups is considered most essential; while in still another, a professional lecturer is chosen for the position. Disagreement obtains also with respect to the amount of independence permitted a health educator in the preparation of educational materials dealing with medical and

nursing subjects. The practice most frequently followed is that whereby technical statements are edited by the specialists in the health field concerned before an article is released, whereas the health educator has full responsibility for editorial considerations and for effective methods of presenting the material.

LICENSURE

No survey of the responsibility assumed by State government for the health of its citizenry would be complete without considering the steps it takes to supervise the admission of candidates to professions which participate in the treatment of human illnesses. State control over members of the various professions known as the healing arts is exercised through systems of licensure which require that every candidate to practice within a given State shall satisfy the responsible examining officials as to his training and character. For the most part, each professional group has its own licensing and examining board. For instance, physicians are licensed by a board of medical examiners, osteopaths by a board of osteopathy, chiropractors by a board of chiropractic examiners, dentists by a board of dentistry, and nurses by a nurses' examining board. In other words, representatives of each practicing body serve as judges regarding the eligibility of new aspirants to their particular profession. A few States require that a candidate shall satisfactorily pass a preliminary examination by a basic science board before his application for examination by the board representing his specialty is accepted. It is a more common procedure, however, to merge examination concerning the basic sciences with testing pertaining to his special field. There are, of course, several variations from this general plan of operation.

Five States have a central department of registration and licensing—variously listed as department of civil service and registration, department of registration and education, and department of law enforcement—which functions as the licensing agency for all branches of the healing arts. In a sixth State, physicians, osteopaths, and chiropractors are licensed by a single commission on licensure, but optometrists, nurses, dentists, and pharmacists are each regulated by separate boards. State health departments participate in the licensure of physicians in 9 States, of osteopaths in 6, and optometrists in 5; in 4 States all of the aforementioned professional groups plus chiropractors are under health department surveillance, but in 2 States of this latter listing the actual examining of candidates is done by the respective individual boards. A similar arrangement also exists in one of the States mentioned above, where a central department of registration operates. The general authority of medical examining boards is sufficiently broad

to cover, in at least a supervisory way, osteopaths in 11 States, chiropractors in 5, nurses in 2, and optometrists, dentists, and pharmacists in 1 each.

Chiropodists constitute the professional group most frequently referred to under the designation "Other," while naturopaths are next in order. Eight States do not recognize chiropractors, and osteopaths are not permitted to practice in 3.

Another group whose methods of operation are subject to regulation because of their health significance are embalmers and funeral directors. Such persons are under the full jurisdiction of their own licensing and examining board in two-thirds of the States; in 11 jurisdictions the health department, either singly or in conjunction with the board of embalmers and funeral directors, is the control agency; in the remaining States, a variety of practices is followed.

EXPENDITURES FOR CENTRAL OFFICE SERVICES AFFECTING ALL BRANCHES OF PUBLIC HEALTH WORK

It has been emphasized throughout this entire series of discussions[6] that portrayal of the presence or absence of specific health services and establishment of the identity of State agencies responsible for designated functions have been the primary purposes of the survey. Consideration of the adequacy or volume of the several services afforded has been more or less incidental. At the same time, a more thorough understanding of the over-all situation is possible when some device is employed to measure the relative emphasis placed upon the different services by the various States. Financial expenditures have been selected as the most satisfactory gauge for measurement of this emphasis.

For the country as a whole, more than 10¾ million dollars, 8 cents per capita, are expended annually by official State agencies for the central services discussed in this chapter. Within individual States, the range extends from 20 thousand dollars in Delaware to nearly 1½ million dollars in New York. (See table 2.) On a per capita basis, however, these two States do not occupy the extreme positions from the standpoint of funds disbursed for central services affecting all branches of public health work. Instead, Ohio and Alaska—expending, respectively, $0.038 and $0.296 per person for these purposes—stand at the opposite ends of the scale. Per capita expenditures of the middle 50 percent of the States for central health services (including vital statistics, laboratory diagnosis, health education, and licensure of certain professional groups—particularly those identified with the healing arts) are defined by the limits of $0.063 and $0.114. The median per capita expenditure is $0.082.

[6] See text footnote [4].

TABLE 2.—*Approximate total and per capita annual expenditures* by all official State agencies for central office services affecting all branches of public health work in each State and Territory, the District of Columbia, and the Virgin Islands, and percentage distribution according to type of central service*

State or Territory	Approximate annual expenditure* for central office services affecting all branches of public health work		Percent of reported total expenditure for central office services affecting all branches of public health work which was devoted to the particular service indicated			
	Total	Per capita	Vital statistics	Laboratory services	Health education (including professional training)	Licensure
Total	$10,781,800	$0.080	13.7	38.8	13.8	33.7
Alabama	228,400	.081	18.5	56.5	21.6	3.4
Arizona	65,000	.130	(a)	18.2	33.7	48.1
Arkansas	114,100	.059	28.0	22.1	15.1	34.8
California	614,400	.089	6.3	10.8	7.6	75.3
Colorado	122,300	.109	9.1	17.2	9.4	64.3
Connecticut	198,000	.116	10.2	51.3	4.5	34.0
Delaware	20,800	.078	10.6	59.6	8.2	21.6
District of Columbia	82,800	.125	14.0	56.8	(a)	29.2
Florida	261,500	.138	24.4	23.7	6.6	45.3
Georgia	204,900	.066	16.1	50.9	33.0	(a)
Idaho	58,100	.111	14.5	48.9	10.8	25.8
Illinois	631,200	.080	11.5	18.6	8.4	61.5
Indiana	194,700	.057	7.1	16.8	25.0	51.1
Iowa	180,000	.071	8.7	33.7	11.5	46.1
Kansas	131,500	.073	16.7	25.0	10.4	47.9
Kentucky	160,700	.056	9.7	16.3	23.8	50.2
Louisiana	152,900	.065	29.0	28.1	9.7	33.2
Maine	42,800	.051	14.5	38.8	19.6	27.1
Maryland	164,300	.090	12.8	41.9	10.7	34.6
Massachusetts	443,700	.103	9.4	39.4	8.9	42.3
Michigan	716,500	.136	6.2	57.1	16.3	20.4
Minnesota	224,100	.080	16.0	(a)	36.6	47.4
Mississippi	137,200	.063	18.0	34.9	38.1	9.0
Missouri	193,900	.051	23.5	25.1	11.7	39.7
Montana	63,800	.114	9.1	28.5	10.7	51.7
Nebraska	136,700	.104	5.1	14.3	6.0	74.6
Nevada	29,900	.271	7.0	36.1	20.1	36.8
New Hampshire	59,100	.120	11.5	48.6	8.3	31.6
New Jersey	370,300	.089	10.3	37.3	3.7	48.7
New Mexico	83,800	.158	16.7	28.8	18.0	36.5
New York	1,416,400	.105	8.1	83.5	8.4	(a)
North Carolina	270,500	.076	10.8	43.2	19.6	26.4
North Dakota	65,700	.102	11.0	36.2	9.7	43.1
Ohio	261,700	.038	8.8	26.0	3.4	61.8
Oklahoma	179,300	.077	22.0	21.2	14.0	42.8
Oregon	135,700	.125	2.9	31.2	13.0	52.9
Pennsylvania	579,900	.059	25.5	23.6	9.5	41.4
Rhode Island	80,500	.113	11.1	72.9	4.2	11.8
South Carolina	105,800	.056	18.5	25.7	27.4	28.4
South Dakota	81,200	.126	10.5	37.7	16.5	35.3
Tennessee	239,700	.082	12.8	31.9	43.4	11.9
Texas	320,600	.050	11.3	24.1	15.0	49.6
Utah	55,200	.100	13.8	29.3	23.9	33.0
Vermont	28,600	.080	(a)	40.2	7.3	52.5
Virginia	143,200	.053	32.0	28.9	23.8	15.3
Washington	98,300	.057	15.1	36.5	17.9	30.5
West Virginia	116,700	.061	17.5	39.9	27.8	14.8
Wisconsin	181,400	.058	10.0	52.6	23.3	14.1
Wyoming	30,000	.120	19.0	39.4	4.3	37.3
Alaska	21,600	.296	37.0	56.0	7.0	(a)
Hawaii	33,000	.078	56.4	(a)	42.7	0.9
Puerto Rico	249,100	.133	50.1	42.5	7.4	(a)
Virgin Islands	(a)	(a)	(a)	(a)	(a)	(a)

* Expenditures for the services considered represent index rather than absolute amounts. Because of variations in fiscal periods, figures cover the most recent year for which information was available at the date of interview. In some instances, because of overlapping and interweaving of activities, estimates were accepted in the absence of precise expenditure records. All funds disbursed by official State agencies for vital statistics, laboratory services, health education—including professional training, and professional licensure—are included, irrespective of their source. State-appropriated moneys constitute 64 percent of the total; Federal grants-in-aid, 20 percent; and contributions by voluntary agencies, and licensing fees, 16 percent. Approximately 5 percent of the total sum expended for central services has already been reported in chapters IV and VII of this series, since this amount was made available for activities pertinent to venereal disease control and maternity and child health services.

a Expenditures for this service as a separate activity were not procurable, and therefore are not a part of the amount listed in the column, "Total."

Wealth of the States, as measured by per capita spendable money income, [7] appears to have small effect upon expenditures by State agencies for central health services. It is true, of course, that the per capita expenditure of the median State in the wealthiest quarter is higher than the corresponding figure for either of the other quarters. Likewise, each of the four medians roughly reflects the position of that particular group of States in the wealth gradation. Nevertheless, the actual difference between them—$0.103 for the wealthiest quarter, $0.085 for the second, $0.086 for the third, and $0.071 for the poorest—is not marked.

Geographic position might be said to exert a slightly greater influence upon a State's per capita expenditure for central health services than does its wealth. This conclusion is based on the fact that the divergence between broad geographic areas[8] is somewhat greater than between the several economic levels. States of the western region stand highest in this respect, with a median outlay of $0.114 per capita, while those of the southern area are lowest, spending $0.064. The northeastern and central portions of the country hold intermediate positions, $0.086 and $0.076 representing their corresponding expenditures, in the order named. The fact must not be obscured that these figures represent expenditures for State activities only and do not include local services. It is quite possible, therefore, that one explanation for the differences cited lies in the larger proportion of work performed by local health units in the Southern States.

One-third of the 10¾ million dollars expended by official State agencies of the entire country for central health services is devoted to licensing activities, 39 percent to laboratory service, and 14 percent each to vital statistics and to health education (including the training of professional personnel). The degree of uniformity or of diversity which exists among the individual States in this apportioning is disclosed by establishing percentage intervals for each of the four types of service under consideration and determining the concentration of States within these intervals. By this procedure it was shown that, although for the country as a whole nearly equal amounts were expended for vital statistics and health education, the behavior of discrete States was less regular with respect to the proportion assigned

[7] Martin, John L., National Income Division, Department of Commerce: Income Payments to Individuals by States, 1929-39. Survey of Current Business, October 1940.

[8] The established geographic areas, with the States contained therein, are as follows: Northeastern Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, and the District of Columbia.

Southern: Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas.

Central: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas.

Western: Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, and California.

to health education than with regard to the percentage charged to vital statistics. Half of the States allotted between 10 and 20 percent of the total sum expended for central services to vital statistics, and one-fourth of them allocated less than 10 percent to this service. Only 10 States expended more than 20 percent of the full amount for vital statistics, and expenditures of 4 of these were influenced, no doubt, by their policy of paying local registrars from State funds instead of merely certifying the registrars' reports for payment by local authorities, as is more customary. Insofar as health education is concerned, the greatest degree of concentration occurred below the 10-percent limit. Twenty States were grouped in this interval, 16 in the one immediately higher (10 to 20 percent), and the remainder above 20 percent.

Considerable variation was noted between the distribution for laboratory service and for licensure, likewise. While few States accredited less than 20 percent to either of these services, laboratory activities received from 20 to 40 percent in half of the States, and more than 40 percent in only 16. The reverse situation occurred with respect to licensure. This service accounted for more than 40 percent of the funds in 21 States—the highest number falling in any one interval, while 19 devoted between 20 and 40 percent to professional licensure.

Appropriations by State legislative bodies make up nearly two-thirds of the 10¾ million dollars expended for central health services, while Federal grants-in-aid constitute one-fifth of the amount, and contributions by voluntary agencies plus fees for licensure account for the additional 16 percent. The major portion of Federal money (15 percent of the total) was made available under title VI of the Social Security Act. The remaining Federal money—4 percent from venereal disease control funds and 1 percent from title V allotments—has also been included in the cost figures reported in chapters IV and VII of this series,[9] which covered complete Federal participation in State activities associated with venereal disease control and improvement of maternity and child health, respectively. This was done because laboratory services and the training of public health personnel are sufficiently significant to these specific problems to warrant utilization of a fraction of the earmarked funds for the general purposes referred to. However, the full cost of maintaining and operating public health laboratories and of training public health personnel cannot be pictured without including all funds allotted thereto. Consequently, this small amount of duplication appears to be essential.

Break-down of expenditures by source of funds does not present a constant picture for the four types of service classified as "Central,

[9] See text footnote [6].

affecting all branches of public health work." Vital statistics and laboratory services are supported primarily by State appropriations, with 15 and 20 percent, respectively, contributed by the Federal Government and only small amounts derived from miscellaneous sources. Conversely, health education activities—including professional training of public health personnel as well as popular education—are carried on chiefly by means of Federal financial participation. More than three-fourths of the cost is borne by such grants-in-aid, as compared with 16 percent by State funds and 7 percent by voluntary agencies. About three-fifths of the expenses associated with professional licensure are charged to State taxes, and license fees account for the other two-fifths.

DISCUSSION

Specialized health programs are partially dependent upon availability of certain central health services which are operated for the State as a whole and which affect all branches of public health work. Such central services include the recording, analysis, and preservation of vital statistics; maintenance of public health laboratories; education of the public and training of professional personnel in approved principles and practices of public health; and licensure of professions significant to health—particularly those constituting the healing arts. For the most part, these services operate as direct State contributions available from the central office and, with the exception of licensing activities, find greatest development in the health department proper. That is, there is less dispersion among the various agencies of State government with respect to assignment of responsibility for providing the central services discussed in this report than for operation of more specialized health programs covered in earlier chapters.

In support of this statement, it will be recalled that the collection and processing of vital statistics is almost exclusively a health department responsibility, Massachusetts and Alaska being the only jurisdictions where some other agency of State government is officially responsible for this service. Health educational activities, likewise, predominantly are functions of the health department, though in a few States there is collaboration between the health department and the State university or the department of education in the carrying on of certain aspects of the program. Insofar as operation of laboratory facilities is concerned, the health department is almost exclusively responsible for diagnosis of disease and analysis of drinking water, but it is not uncommon for other State agencies—particularly public service divisions of State universities, departments of agriculture, and independent State laboratories or laboratory departments—to be charged with bacteriological and chemical analysis of milk, food, and drug samples. Licensure of professional groups is affected largely by

individual examining and licensing boards representing the various professions. At the same time, in a few States this function is included in the regulatory authority of the State health department.

A considerable degree of variation characterizes the development of the central State services affecting all branches of public health work. States differ with respect to both the amount of analytical study that is made of vital statistics records and the extent to which the information obtained is utilized. They also follow diverse practices from the standpoints of items recorded, methods of collecting and submitting records, and administrative relationships between the State agency and local registrars. Inequalities of emphasis mark the development of the major branches of service of State-owned public health laboratories also. While all States operate laboratory facilities for diagnosis of communicable diseases and analysis of water samples, aid in the diagnosis of noncommunicable illnesses is provided by the State far less commonly. In five jurisdictions, no State agency makes either bacteriological or chemical analyses of milk, and in an equal number analysis of foods and drugs is not considered a State function. About half of the laboratories of State health departments engage in the manufacture of biologicals for preventive or therapeutic purposes. Typhoid fever vaccine and silver nitrate are the materials most commonly prepared. Usually, where the State supervises diagnostic procedures of private laboratories such supervision covers serological tests only; however, some 9 States extend this supervision to cover all types of tests having public health significance. Differences in organization of health education programs are illustrated by the fact that about half of the State health departments maintain special units or employ full-time personnel for the sole purpose of disseminating health educational material among the public at large or special groups thereof. In the remaining States, all educational work is done by the separate division chiefs or their representatives. Finally, variation is inherent also in the development of State licensure of professions and facilities rendering health service. Certain branches of the healing arts are not permitted to practice in some States; in other jurisdictions, State licensure of sanitation personnel, of barbers and beauticians, and/or of hospitals is not required.

Annual expenditures for the aforementioned central health services, which affect all branches of public health work, total more than 10¾ million dollars. Of this amount, nearly two-thirds is State-appropriated, one-fifth represents Federal grants, and the remainder either is contributed by voluntary agencies or paid as examining fees by professional licensees. Neither State wealth nor geographic position appears to exert an appreciable weight upon the amount expended by an individual State for central health services. Of the two char-

acteristics, however, geographic position seems to be the more influential.

From the standpoint of each separate service included in this chapter, about one-third of the total amount was charged to professional licensure, slightly more to laboratory services, and the remainder was evenly divided between vital statistics and health education.

PROVISIONAL MORTALITY RATES FOR THE FIRST 9 MONTHS OF 1942

The mortality rates in this report are based upon preliminary data for 35 States, the District of Columbia, and Hawaii for the first 9 months of 1942. Comparative data by quarters for 1940 and 1941 are presented for 26 States and the District of Columbia.

This report is made possible through arrangement with the respective States which voluntarily furnish provisional monthly tabulations of current birth and death statistics to the United States Public Health Service, which analyzes and publishes the data. Because of lack of uniformity in the method of classifying deaths according to cause as well as some delay in filing certificates, these data are preliminary and may differ in some instances from the final figures subsequently published by the Bureau of the Census.

In the past these preliminary reports have accurately reflected the trend in mortality rates for the country as a whole. Some deviation from the final figures for individual States, especially for figures of specific causes of death, may be expected because of the provisional nature of the information. Nevertheless, it is believed that the trend in mortality within each State is correctly represented. Comparisons of specific causes of death for different States may be subject to some error because of variations in tabulation procedure and promptness of filing the original certificates.

During the first 9 months of 1942 the provisional death rate was 10.2 per 1,000 population compared with 10.5 and 10.8 for the first 9 months of 1941 and 1940. The death rate for the calendar year 1941 was the lowest in the history of death registration in this country. Since the rate for the first 9 months of 1942 is about 3 percent less than the rate for the corresponding period of 1941, it is possible that, unless there was a sharp increase in mortality rates during the last quarter of 1942, the death rate for the calendar year 1942 may be even less than the record low for 1941. The decrease in the death rate from all causes has been widespread; 25 of the 33 States from which data are available reported a lower rate in 1942 than in 1941.

A lower death rate also was reported for each of the important causes except cancer and cerebral hemorrhage. The rate for each of

these two causes was about 1 percent higher than the corresponding rate for 1941. Although the death rate from accidental causes dropped 7 percent compared with the previous year, the decrease resulted from a marked drop in the relative number of fatal automobile accidents—24 percent compared with 1941. The death rate from accidental causes exclusive of automobile accidents actually increased about 4 percent, very likely due to an increase in deaths from industrial injuries.

Among the minor causes of death, only cerebrospinal meningitis caused relatively more deaths in 1942; the rate for this decrease increased from 0.5 per 100,000 population in 1941 to 0.6 per 100,000 population in 1942.

One of the principal reasons for the low death rate during the first 9 months of 1942 was the unusually small number of deaths from the respiratory diseases. The death rate from influenza, which is usually above 20 per 100,000 population, was only 7 per 100,000 during the first 9 months of 1942. The rate for the entire year probably will be somewhat above 7, but even so the record will be definitely better than that of previous years. Pneumonia and tuberculosis also took fewer deaths than in the previous year.

In spite of a sharp rise in the birth rate—nearly 8 percent over 1941—both the infant and maternal mortality rates continued to decline. Unless an unexpected increase occurred during the last 3 months of the year, the rate for each of these will be a new low. Of the 29 States from which reports are available only 4 reported a higher infant mortality rate and 6 a higher maternal mortality rate than in 1941.

Provisional mortality from certain causes in the first 9 months of 1942, with comparative provisional data for the corresponding period in preceding years

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births: Total infant mortality	Rate per 1,000 live births: Maternal mortality	Death rate per 100,000 population (annual basis): Typhoid and paratyphoid fever (1-2)	Dysentery (27)	Diarrhea and enteritis under 2 years (119)	Scarlet fever (8)	Diphtheria (10)	Whooping cough (9)	Measles (35)	Cerebrospinal (meningococcus) meningitis (6)	Acute poliomyelitis and polioencephalitis (36)	Acute infectious encephalitis (lethargic) (37)	Tuberculosis, all forms (13-22)	Syphilis (30)	Influenza (grippe) (33)	Pneumonia, all forms (107-109)	Cancer, all forms (45-55)	Diabetes mellitus (61)	Cerebral hemorrhage, embolism, and thrombosis (83 a, b)	Diseases of the heart (90-95)	Nephritis, all forms (130-132)	All accidents, including automobile accidents (169-195)	Automobile accidents (170 a, b, c)
27 States [1]																									
January-September:																									
1942	10.2	19.5	40	2.5	0.4	0.9	5.7	0.3	0.4	1.7	1.0	0.6	0.3	0.4	41.5	11.3	7.4	44	123	26.1	89	294	71	67	20.2
1941	10.5	18.1	44	3.0	.6	(2)	6.7	.3	.5	2.6	1.9	.5	.5	.8	43.9	(2)	16.4	47	122	27.1	88	298	75	72	26.6
1940	10.8	17.1	44	3.7	.8	(2)	5.4	.6	.8	1.7	.3	.5	.6	.6	44.9	(2)	14.6	53	121	27.9	91	303	81	69	22.6
January-March:																									
1942	11.1	18.6	46	2.6	.3	.4	4.2	.5	.7	1.9	1.5	.6	.2	.4	43.2	12.1	13.9	66	124	29.7	98	333	79	66	23.0
1941	11.8	17.1	50	2.9	.4	(2)	3.2	.5	.7	2.7	1.5	.6	.2	.5	45.7	(2)	39.1	78	121	31.9	97	347	85	68	23.9
1940	12.1	16.1	51	3.9	.4	(2)	3.2	.9	1.2	1.7	.4	.7	.2	.5	45.9	(2)	31.2	86	123	32.7	103	348	91	66	20.0
April-June:																									
1942	10.0	18.7	39	2.4	.4	.7	3.1	.3	.3	1.7	1.2	.8	.1	.4	43.7	11.2	6.1	39	122	25.7	87	290	71	66	18.7
1941	10.3	17.5	43	3.2	.5	(2)	4.3	.4	.4	2.8	3.7	.5	.2	.5	46.1	(2)	7.9	40	123	26.8	88	296	75	70	25.0
1940	10.5	16.8	43	3.8	.5	(2)	4.1	.6	.5	1.7	.4	.5	.1	.6	47.0	(2)	9.8	47	120	26.8	90	302	81	65	21.8
July-September:																									
1942	9.5	21.1	37	2.6	.5	1.7	[4] 9.7	.2	.3	1.6	.2	.4	.6	.4	37.6	10.5	2.3	26	123	23.0	81	261	63	68	19.2
1941	9.5	19.7	39	2.8	1.0	(2)	[4] 12.5	.1	.5	2.4	.7	.3	1.1	1.3	39.9	(2)	2.5	25	121	22.6	79	254	65	79	30.3
1940	9.7	18.3	39	3.3	1.3	(2)	[4] 9.0	.3	.5	1.8	.2	.3	1.5	.6	42.0	(2)	3.1	28	121	24.3	82	259	70	76	26.1
Industrial policyholders: [3]																									
1942	7.4	----	----	----	.3	----	4.2	.4	.5	1.0	.6	----	----	----	42.1	10.7	4.3	30	104	27.8	60	[5] 156	50	[6] 51	17.2
1941	7.6	----	----	----	.4	----	4.4	.5	.6	1.3	1.0	----	----	----	43.8	11.4	9.1	33	104	27.8	61	[5] 157	52	[6] 51	20.2
1940	7.7	----	----	----	.6	----	4.3	.6	.8	1.2	.4	----	----	----	45.1	11.6	8.6	38	102	29.2	61	[5] 160	57	[6] 46	16.8
Colorado:																									
1942	10.8	19.3	52	2.0	.5	.9	10.3	1.1	1.2	2.8	1.8	.7	.5	.6	50.1	9.8	8.3	74	116	17.2	93	258	74	89	25.7
1941	10.6	18.8	51	3.0	.8	(2)	10.7	.8	1.9	5.9	1.6	.6	.7	2.2	50.8	(2)	21.4	63	108	16.3	82	271	78	69	22.4
1940	10.9	18.9	52	4.1	.6	(2)	10.1	.4	1.3	3.0	1.5	.4	1.3	.7	51.5	(2)	12.5	71	120	17.7	86	256	70	88	31.4

Connecticut:																									
1942	9.2	17.2	30	2.2	.1	(7)	2.6	(7)	(7)	.4	.3	.5	(7)	.1	33.9	6.6	1.8	25	134	28.2	81	300	60	56	13.9
1941	9.2	13.2	32	2.7	.2	(2)	1.8	.2	(7)	.5	.1	.2	2	(7)	32.4	(2)	5.5	29	130	31.6	78	311	62	59	19.4
1940	9.8	12.3	39	3.2	.3	(2)	2.1	(7)	.2	3	.2	.4	.1	.2	32.8	(2)	5.1	43	142	22.2	106	304	57	54	16.6
Delaware:																									
1942	11.8	19.5	38	1.5	(7)	(7)	9.8	2.0	(7)	5	(7)	(7)	(7)	1.0	52.8	12.7	5.9	50	127	31.3	106	377	131	75	24.4
1941	11.9	18.4	44	1.9	(7)	(2)	8.9	1.0	(7)	2.5	2.0	(7)	1.0	(7)	54.9	(2)	13.8	53	121	28.2	94	355	132	82	34.1
1940	12.4	16.9	51	4.4	1.0	(2)	4.0	1.5	(7)	2.5	(7)	1.0	.5	(7)	49.5	(2)	12.5	59	141	31.5	106	356	139	73	33.2
District of Columbia:																									
1942	10.5	24.0	45	2.5	.3	2	17.0	2	.3	2.7	(7)	1.9	.2	(7)	59.5	20.0	2.4	58	130	26.5	69	269	88	64	14.9
1941	11.7	24.2	51	2.7	.7	(2)	18.0	(2)	.4	1.8	7	.7	1.3	.2	59.7	(2)	4.9	70	145	25.1	83	293	101	71	21.3
1940	12.8	21.9	45	3.0	1.0	(2)	9.7	.2	.4	1.8	(7)	.8	.4	.8	65.9	(2)	7.7	80	147	33.7	91	334	116	70	20.1
Florida:																									
1942	11.0	18.2	52	4.8	1.4	1.8	8.2	.1	1.1	2.4	3.3	.7	.2	.1	42.7	19.0	14.2	49	95	19.0	108	257	76	98	26.8
1941	12.0	18.2	54	6.7	1.6	(2)	9.0	.1	.9	1.9	1.2	.7	2.0	4	46.9	(2)	32.3	50	103	21.3	112	282	88	113	39.6
1940	12.1	16.4	56	7.0	1.2	(2)	7.1	.1	1.0	1.8	4	.4	.3	.3	51.8	(2)	31.9	58	96	19.2	112	293	90	94	34.2
Georgia:																									
1942	8.6	21.0	52	4.0	.8	2.7	8.7	.1	1.0	3.2	2.4	5	.4	.1	38.2	13.7	15.0	50	63	10.9	85	157	96	60	19.6
1941	9.8	20.7	60	4.5	1.7	(2)	15.4	3	1.1	4.7	6.1	.5	1.1	.1	42.3	(2)	38.1	53	64	11.8	94	180	103	65	26.3
1940	10.0	19.8	59	5.3	2.0	(2)	13.3	.5	1.5	2.9	9	.3	.2	(3)	48.5	(2)	33.8	67	61	10.9	93	192	103	60	20.7
Hawaii:																									
1942	7.5	23.5	40	2.7	1.8	(7)	6.1	.3	3	4.0	3	.6	(7)	(7)	58.8	13.2	3.1	47	66	16.8	47	135	60	94	19.0
1941	7.0	22.7	42	2.5	1.6	(2)	9.9	(7)	.6	2.2	1.6	(7)	6	3	57.5	(2)	3.1	39	76	19.3	52	127	51	69	20.2
1940	7.2	22.5	45	2.1	2.5	(2)	6.0	(7)	1.9	2.5	5.0	.6	1.6	(7)	61.8	(2)	5.0	47	68	14.5	43	121	61	57	12.6
Idaho:																									
1942	8.4	20.9	34	2.2	1.2	(7)	.5	(7)	.7	.7	.7	.2	(7)	.2	12.5	2.7	8.9	49	77	13.8	81	231	51	86	20.9
1941	8.4	22.7	34	2.3	1.0	(2)	1.5	.5	(7)	4.7	.2	.5	.2	1.0	14.2	(2)	12.2	32	86	19.5	72	209	55	90	33.0
1940	9.0	22.5	36	3.4	.8	(2)	5.8	.8	.3	1.8	1.3	1.0	.8	1.0	18.0	(2)	13.2	31	88	17.5	57	232	55	103	36.2
Illinois:																									
1942	11.0	17.8	35	2.0	.3	.7	2.8	.3	.7	1.3	.6	2	3	.3	41.0	10.6	4.4	39	147	30.6	84	354	81	65	21.3
1941	10.7	16.4	35	2.6	.4	(2)	3.2	.5	.6	1.1	1.4	.2	.3	.4	45.2	(2)	7.2	41	144	29.0	79	340	87	74	29.5
1940	11.2	15.2	36	3.0	.5	(2)	2.5	1.0	1.1	.7	.2	.2	.4	.4	47.1	(2)	9.0	48	142	33.5	83	353	93	72	27.3
Indiana:																									
1942	10.5	18.8	38	2.8	.2	.4	6.4	.5	.3	2.0	.4	.1	.6	.3	35.5	9.7	15.7	47	120	12.9	131	244	76	76	27.7
1941	11.1	17.4	38	3.0	.6	(2)	5.8	.7	.7	1.6	2.1	.5	.3	.2	37.4	(2)	23.0	49	121	15.1	138	272	66	91	39.7
1940	11.5	16.6	42	3.0	.8	(2)	3.3	1.2	.9	2.6	.1	.2	2.3	.5	38.9	(2)	24.7	59	122	15.4	144	311	79	80	29.8
Iowa:																									
1942	9.4	18.2	34	2.2	(7)	2	2.3	[illegible]	.3	1.2	.7	.1	.1	.3	15.3	6.0	8.2	35	138	23.7	105	274	58	63	16.1
1941	9.6	17.5	38	2.8	.2	(2)	1.6	[illegible]	.3	1.7	.6	.4	.2	.8	13.6	(2)	15.0	42	130	25.0	99	277	59	65	22.2
1940	10.0	16.3	38	3.7	4	(2)	1.9	7	.6	.9	.5	.6	2.1	.8	17.0	(2)	18.9	49	130	26.2	107	287	66	63	18.7
Kansas:																									
1942	10.1	17.9	37	2.6	.2	5	4.0	.4	.1	1.0	1.6	.3	.7	1.0	25.0	10.7	14.6	31	124	26.3	110	283	84	76	20.6
1941	10.5	16.9	39	2.2	.3	(2)	2.5	.3	.4	4.0	2.4	.6	3	1.6	24.4	(2)	25.9	37	122	24.5	106	280	96	80	29.6
1940	10.4	15.7	38	4.1	.6	(2)	4.1	.5	.7	1.6	1.1	.6	2.2	1.0	25.0	(2)	21.4	36	123	25.9	101	275	101	77	25.3
Kentucky:																									
1942	9.3	(2)	(2)	(2)	1.4	5.3	13.4	9	1.3	3.9	1.0	.9	.9	.2	62.4	9.0	15.6	55	82	14.3	87	217	77	67	17.6
1941	10.5	20.9	60	4.6	2.4	(2)	20.4	1.1	.9	8.4	6.8	1.0	.8	.1	69.9	(2)	44.3	59	83	15.7	94	222	76	76	27.3
1940	10.3	20.8	52	4.0	2.3	(2)	12.0	.8	1.5	4.6	.6	1.1	1.4	.5	67.2	(2)	30.2	60	84	13.9	106	215	73	77	23.3

See footnotes at end of table

Provisional mortality from certain causes in the first 9 months of 1942, with comparative provisional data for the corresponding period in preceding years—Continued

State and period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births: Total infant mortality	Rate per 1,000 live births: Maternal mortality	Death rate per 100,000 population (annual basis): Typhoid and paratyphoid fever (1-2)	Dysentery (27)	Diarrhea and enteritis under 2 years (119)	Scarlet fever (8)	Diphtheria (10)	Whooping cough (9)	Measles (35)	Cerebrospinal (meningococcus) meningitis (6)
Louisiana:												
1942	9 5	21 4	53	3.6	1 9	1 7	8 4	0 1	1 3	2 6	1 5	0 8
1941	10 1	21 1	62	4 7	3 0	(2)	10.2	2	1 1	2 0	1	7
1940	11.1	20.6	64	5.8	3 9	(2)	14 0	.1	1 4	7.2	.7	.6
Maine												
1942	12 1	20 2	43	2 0	3	.2	7 5	9	3	2 2	1 7	2.5
1941	12 5	18 4	48	2.7	5	(2)	6.1	2	3	2 0	1 3	1 [illegible]
1940	12 0	17.5	53	4.1	6	(2)	5 0	9	8	2 0	1 4	1.[illegible]
Maryland:												
1942	11 7	20.7	46	1 9	.4	1 0	11 7	.1	1	1 5	.9	2 5
1941	12.0	18 8	53	1 9	.8	(2)	10 9	.1	(7)	4.3	.9	1 2
1940	12.3	16 6	49	2 7	.5	(2)	5 3	.4	3	3 4	.1	4
Massachusetts												
1942	11.5	(2)	(2)	(2)	.1	1	2 3	3	2	.8	.5	.8
1941	11.9	(2)	(2)	(2)	(8)	(2)	4.6	3	1	1 1	1	.7
1940	11 7	(2)	(2)	(2)	.3	(2)	2.3	2	2	3	3	2
Michigan:												
1942	9 4	21 7	37	2.1	.1	6	4.1	.5	3	1 2	.2	3
1940	9 8	19 4	39	2 9	.2	(2)	4 4	.6	3	1 8	1 6	.1
1941	9 8	18.5	41	3 3	.2	(2)	3 5	.9	4	1 0	.4	2
Minnesota:[9]												
1942	9 3	19 1	33	1.5	1	2	2 5	.3	3	.6	7	.2
1941	9.7	18.7	36	2.4	(7)	(2)	2 6	.2	4	1 2	.1	4
1940	9.8	18 5	35	2 4	.2	(2)	2.4	.6	2	1 1	2	.2
Montana:												
1942	9.4	20 1	37	2.1	(7)	.2	3.1	.7	.9	2.1	(7)	1 2
1941	10.2	20.6	38	1.7	.2	(2)	4 3	1 7	2.9	1.2	.2	.2
1940	10 0	20 4	43	3.3	7	(2)	6 4	2 1	1 0	7	1 2	1 0

State and period	Acute poliomyelitis and polioencephalitis (36)	Acute infectious encephalitis (lethargic) (37)	Tuberculosis, all forms (13-22)	Syphilis (30)	Influenza (grippe) (33)	Pneumonia, all forms (107-109)	Cancer, all forms (45-55)	Diabetes mellitus (61)	Cerebral hemorrhage, embolism, and thrombosis (83 a, b)	Diseases of the heart (90-95)	Nephritis, all forms (130-132)	All accidents, including automobile accidents (169-195)	Automobile accidents (170 a, b, c)
Louisiana:													
1942	0 5	0 2	51 0	23 9	12 7	52	87	16 4	68	227	70	50	18.5
1941	3	.1	58.3	(2)	30 8	60	85	15.8	64	250	86	72	27.2
1940	7	.2	60.5	(2)	34 0	78	87	19 0	70	252	87	69	21.4
Maine													
1942	3	.6	31 8	5.9	10 3	51	147	28.7	124	353	79	80	18.4
1941	.3	.5	31 3	(2)	23.2	56	151	31.9	122	373	91	74	23.2
1940	3	.3	28.2	(2)	12.3	51	147	29 7	124	357	88	71	20.9
Maryland:													
1942	(7)	.5	74 1	18 9	5.1	57	135	29 2	92	340	110	81	23.3
1941	.2	6	77.7	(2)	11 4	61	142	31.0	92	343	117	78	29.0
1940	.3	4	82.9	(2)	9 7	67	139	31.7	98	352	131	76	24.2
Massachusetts													
1942	(7)	.3	39 0	5.7	2.3	54	174	36.2	108	410	60	61	12.8
1941	(8)	.4	38.5	(2)	8 3	64	176	36.4	111	434	65	62	15.6
1940	(8)	.3	38.9	(2)	3 4	60	171	36.3	104	414	72	61	13.8
Michigan:													
1942	.2	.3	34.3	9 9	3 3	41	116	25.5	85	284	49	68	25.5
1940	3	2	32.6	(2)	9 6	43	116	25.8	87	290	53	81	26.9
1941	1.3	.3	34.8	(2)	5.0	45	117	27.0	91	293	55	73	29.9
Minnesota:[9]													
1942	.3	.5	24.9	8 1	7 6	51	135	25.1	93	273	43	61	17.9
1941	.2	.4	30 2	(2)	14.7	55	142	25.7	82	270	41	65	16.1
1940	.7	.6	27.4	(2)	9 5	58	133	26.4	89	272	39	67	20.6
Montana:													
1942	(7)	.9	35.0	10.9	5 9	43	113	12.8	91	251	55	82	19.4
1941	1.0	3.3	38.0	(2)	20.2	47	110	14.0	95	245	57	100	23.3
1940	1 0	2.1	41 3	(2)	12.6	48	111	10.5	98	230	57	90	24.1

Nebraska:																									
1942	9.1	17.5	32	1.8	.1	.2	1.8	.4	.6	1.1	.7	.3	1.4	.3	13.0	7.6	10.5	32	131	25.6	89	259	63	64	15.9
1941	9.5	16.8	35	2.7	.2	(2)	1.3	.1	.3	2.8	.4	.6	1.0	1.5	15.5	(2)	27.9	36	125	24.9	104	235	66	63	18.9
1940	9.7	16.7	35	3.1	.4	(2)	2.6	.9	.6	.4	.4	.3	.8	.5	18.3	(2)	20.8	47	128	26.9	106	239	65	66	17.4
Nevada:																									
1942	14.7	21.7	59	.5	2.3	7.0	12.8	1.2	(7)	8.2	2.3	2.3	1.2	2.3	64.1	14.0	7.0	66	124	15.2	104	372	65	244	87.4
1941	11.6	18.4	44	3.9	3.6	(2)	4.7	(7)	(7)	1.2	(7)	(7)	(7)	1.2	55.8	(2)	8.3	44	112	15.4	71	311	55	231	104.4
1940	12.0	19.0	47	5.1	(7)	(2)	3.6	(7)	1.2	3.6	(7)	1.2	1.2	(7)	68.8	(2)	7.2	65	111	20.5	66	304	58	160	70.0
New Mexico:																									
1942	9.3	25.2	94	3.9	1.0	8.6	30.7	(7)	1.4	7.2	7.4	.7	1.7	1.0	55.2	9.8	14.2	63	50	6.5	38	118	45	78	26.2
1941	10.5	27.2	97	3.8	2.2	(2)	47.5	.2	2.0	11.3	11.3	.2	.2	.5	66.6	(2)	18.1	55	52	11.5	43	116	49	97	40.7
1940	10.6	31.0	88	4.7	2.2	(2)	42.7	.2	1.5	10.2	1.0	.5	.5	(7)	74.7	(2)	12.5	52	56	10.2	42	116	50	90	40.7
New York:																									
1942	10.7	17.1	32	2.2	.2	.2	3.0	.2	.1	1.0	.1	.8	.2	.8	42.8	13.4	1.7	37	162	38.0	71	380	54	58	15.0
1941	10.9	15.7	32	2.3	.2	(2)	2.7	.2	.1	.7	.4	.5	.3	.9	46.6	(2)	4.7	45	156	40.2	71	385	59	61	17.8
1940	11.2	14.7	37	3.1	.2	(2)	3.0	.3	.1	1.1	.1	.4	.1	.9	47.7	(2)	3.3	47	157	40.6	72	385	66	61	16.5
North Carolina:																									
1942	8.0	23.3	51	3.8	.5	1.7	13.0	.4	.9	3.1	2.0	.5	.3	.1	44.8	7.5	8.3	47	59	12.2	83	159	79	64	23.9
1941	9.0	23.6	61	4.5	1.0	(2)	19.4	.3	1.4	6.0	3.3	.3	.3	.4	50.1	(2)	31.4	58	60	12.6	80	161	85	69	33.0
1940	9.1	22.5	58	5.8	1.1	(2)	12.9	.3	2.5	2.1	.4	.3	.4	.4	50.5	(2)	25.9	61	58	14.0	85	153	98	62	23.4
North Dakota:																									
1942	7.1	19.6	38	2.8	.2	.4	6.1	.4	.2	2.1	1.9	.2	.2	1.9	21.2	2.7	4.0	33	91	19.1	74	173	37	39	13.6
1941	8.3	21.9	39	1.9	(7)	(2)	3.8	.4	1.3	2.3	.4	(7)	.4	.2	20.6	(2)	13.2	37	90	21.2	75	205	48	63	15.9
1940	7.9	21.1	39	1.5	.6	(2)	5.4	1.0	1.7	1.9	.2	(7)	.2	1.7	19.6	(2)	10.2	39	98	23.3	71	207	41	54	17.1
Ohio:																									
1942	10.9	19.2	39	2.0	.2	.3	6.0	.4	.2	2.1	.5	.1	.3	.2	41.1	11.7	9.0	46	135	30.8	105	314	76	81	27.1
1941	11.1	17.2	41	2.6	.3	(2)	7.0	.3	.3	2.7	2.1	.2	.7	.7	42.4	(2)	16.5	44	137	29.0	104	309	73	87	32.5
1940	11.4	16.5	38	3.6	.8	(2)	4.2	.7	.4	1.7	(7)	.4	.6	.5	40.6	(2)	15.0	55	136	30.9	113	316	78	87	27.0
Oklahoma:																									
1942	9.1	20.9	41	3.7	1.5	3.0	4.4	.2	1.4	2.4	5.7	.4	.6	.5	46.9	6.9	12.9	48	91	16.0	87	194	55	71	17.3
1941	8.8	19.7	51	2.9	1.6	(2)	4.4	.3	2.3	6.4	1.1	.3	.6	.4	46.4	(2)	28.1	53	83	15.2	78	186	56	61	21.3
1940	8.7	18.7	47	3.6	2.4	(2)	10.0	.3	2.2	2.1	.2	1.1	1.5	.7	47.4	(2)	23.6	56	82	14.2	81	162	63	56	18.8
Pennsylvania:																									
1942	10.6	20.0	36	1.4	.3	.2	3.6	.4	.1	1.3	.5	.7	.2	.2	38.6	10.5	5.9	40	125	32.4	85	333	83	51	15.0
1941	10.8	18.2	38	2.4	.5	(2)	4.3	.3	.3	1.6	1.3	.3	.7	.7	39.7	(2)	12.8	45	123	34.8	84	337	85	58	18.1
1940	11.0	16.3	43	2.7	.6	(2)	3.7	.5	.4	1.2	.1	.7	.3	.6	40.5	(2)	12.2	51	124	35.6	85	337	97	57	15.3
Rhode Island:																									
1942	10.7	18.4	40	2.2	.2	(7)	9.7	.2	.5	1.1	.7	.4	.2	.4	38.2	9.5	2.4	49	143	36.0	96	359	81	56	10.8
1941	11.0	16.1	37	2.3	(7)	(2)	2.6	.1	(7)	.2	.2	.4	.6	.4	38.3	(2)	6.8	46	149	38.8	83	382	104	50	10.2
1940	11.2	15.2	38	2.5	1.3	(2)	1.9	(7)	.4	.4	.6	.9	.4	.2	32.9	(2)	4.3	55	160	38.7	100	369	96	49	10.9
South Dakota:[9]																									
1942	8.6	18.6	41	2.2	.6	(7)	2.2	.3	3.1	7.2	(7)	1.3	(7)	(7)	26.4	6.3	7.2	51	99	17.3	85	211	53	46	16.0
1941	9.0	18.6	48	1.9	.3	(2)	1.9	.3	1.6	3.8	.3	.3	(7)	.6	30.2	(2)	22.3	53	101	28.9	85	214	54	62	15.4
1940	9.2	18.5	42	4.6	(7)	(2)	4.1	1.3	.9	(7)	.9	.3	(7)	.3	45.3	(2)	21.3	45	99	24.4	84	228	53	54	10.3
Tennessee:																									
1942	8.9	19.8	51	3.4	.6	2.7	8.2	.5	.8	2.1	1.5	.6	1.0	.5	70.0	12.5	17.3	54	77	12.3	82	176	60	59	16.5
1941	9.8	19.1	58	3.9	1.5	(2)	12.8	.3	1.0	6.6	5.5	1.1	1.1	.6	80.3	(2)	39.0	65	88	12.4	79	175	65	61	20.3
1940	10.2	17.8	56	5.4	2.1	(2)	10.6	.5	1.1	3.6	.8	.6	.1	.6	74.9	(2)	35.8	75	72	14.2	85	195	62	63	16.2
Texas:																									
1942	8.7	(2)	(2)	(2)	1.4	(2)	18.1	.3	1.6	2.3	2.0	.6	.4	.2	54.5	(2)	14.0	41	79	13.2	62	187	59	72	22.1
1941	9.3	(2)	(2)	(2)	2.1	(2)	16.7	.1	1.9	3.9	1.5	.5	.8	.4	56.2	(2)	34.7	47	79	13.1	60	190	63	75	28.8
1940	9.5	(2)	(2)	(2)	3.5	(2)	34.5	.2	2.0	4.3	4.1	.4	.6	.5	58.2	(2)	28.2	55	75	14.1	62	179	57	66	24.4

See footnotes at end of table.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 6, 1943

Summary

Morbidity reports for the week ended February 6 show that of the nine common communicable diseases included in the following tables the incidence of only meningococcus meningitis and poliomyelitis is above the respective 5-year (1938–42) medians. Slight increases over the figures for the preceding week are shown for smallpox, typhoid fever, and whooping cough, and moderate increases for measles and scarlet fever.

There were 330 cases of meningococcus meningitis reported for the week, more than reported for any single week of any prior year since the week ended March 28, 1936. For the preceding week a total of 339 cases was reported. Of the current week's total, 71 cases were reported in the South Atlantic States (18 in Virginia and 14 in Maryland), 67 in the Middle Atlantic States (39 in New York and 16 in Pennsylvania), 46 in the Pacific States (24 in California), and 42 in the New England States (23 in Rhode Island). Missouri and Texas each reported 13 cases.

The number of cases of measles increased from 10,887 to 13,444, which is less, however, than was reported for the corresponding week of any of the past 5 years except 1939 and 1940. The largest numbers were reported in Pennsylvania (2,846), New York (1,205), and Washington (915).

The number of reported influenza cases declined from 4,852 to 4,327, of which 2,908 cases, or 69 percent, were reported in Texas (1,589), Virginia (660), and South Carolina (659).

The number of poliomyelitis cases reported for the week decreased from 31 to 28. The corresponding median is 21. Cases reported for the week were scattered in 16 States, no State reporting more than 3 cases.

Other reports include 1 case of anthrax (in Pennsylvania), 180 cases of dysentery, 13 cases of encephalitis, 20 cases of tularemia, and 55 cases of endemic typhus fever.

The number of deaths for the current week in 89 large cities of the United States aggregated 10,016, as compared with 10,163 for the preceding week. The accumulated figure for the first 5 weeks of 1943 is 51,216, as compared with 46,890 for the corresponding period of 1942.

Telegraphic morbidity reports from State health officers for the week ended February 6, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median, 1938–42	Week ended—		Median, 1938–42	Week ended—		Median, 1938–42	Week ended—		Median, 1938–42
	Feb. 6, 1943	Feb. 7, 1942		Feb. 6, 1943	Feb. 7, 1942		Feb. 6, 1943	Feb. 7, 1942		Feb. 6, 1943	Feb. 7, 1942	
NEW ENG.												
Maine	1	0	0	------	2	4	12	269	104	[3] 11	0	0
New Hampshire	0	0	0	------	------	------	23	0	16	1	0	0
Vermont	0	0	0	------	------	------	308	3	12	0	0	0
Massachusetts	5	4	4	------	------	------	572	462	438	6	4	1
Rhode Island	5	3	0	------	1	------	20	100	19	23	0	0
Connecticut	1	3	1	17	------	8	506	170	143	1	1	1
MID. ATL.												
New York	7	16	26	[1] 12	[1] 10	[1] 19	1,205	555	706	39	9	7
New Jersey	1	5	10	18	23	42	726	165	165	12	3	2
Pennsylvania	10	11	43	2	------	------	2,846	1,553	1,553	16	5	5
E. NO. CEN.												
Ohio	13	17	18	14	14	14	130	180	180	11	2	2
Indiana	7	10	18	8	40	40	321	78	78	6	0	1
Illinois	10	17	20	14	29	54	371	171	171	8	1	1
Michigan [2]	8	1	10	35	21	14	166	110	420	5	1	0
Wisconsin	6	0	0	84	35	51	641	241	554	8	1	0
W. NO. CEN.												
Minnesota	5	3	2	2	2	5	21	461	380	4	0	0
Iowa	1	4	4	------	7	11	75	103	103	1	0	0
Missouri	8	4	7	3	8	24	147	189	31	13	1	1
North Dakota	0	5	3	28	35	27	7	190	19	1	0	0
South Dakota	0	2	2	2	------	1	136	0	31	2	0	0
Nebraska	4	0	1	38	------	------	95	25	25	2	2	0
Kansas	6	4	5	11	14	14	348	278	278	4	0	0
SO. ATL.												
Delaware	0	0	0	------	------	------	3	24	24	0	0	0
Maryland [2]	4	13	8	17	40	61	19	340	25	14	5	0
Dist. of Col.	2	1	3	2	1	5	30	18	14	2	1	0
Virginia	12	14	14	660	369	1,100	201	140	140	18	3	1
West Virginia	5	8	8	23	27	42	5	584	125	2	3	3
North Carolina	14	12	17	35	80	80	56	1,003	570	10	1	1
South Carolina	4	14	6	659	871	871	23	205	114	10	0	2
Georgia	1	7	7	133	117	131	40	40[illegible]	97	6	0	1
Florida	6	5	7	3	14	14	17	114	61	9	0	0
E. SO. CEN.												
Kentucky	4	7	7	7	10	91	608	47	63	1	1	3
Tennessee	11	6	8	71	127	172	204	112	74	4	1	3
Alabama	13	14	12	215	700	700	13	94	90	4	1	2
Mississippi [2]	4	3	5	------	------	------	------	------	------	7	4	1
W. SO. CEN.												
Arkansas	5	10	10	203	426	426	201	289	120	1	3	1
Louisiana	2	14	9	13	24	24	35	47	3	2	2	2
Oklahoma	6	5	9	82	231	231	20	252	48	0	0	1
Texas	50	42	42	1,589	1,693	1,693	199	1,909	218	13	2	2
MOUNTAIN												
Montana	4	7	1	1	31	25	163	168	63	0	0	0
Idaho	1	0	0	1	------	2	278	6	14	0	0	0
Wyoming [2]	0	0	0	54	119	4	38	39	7	2	1	1
Colorado	15	6	6	93	85	35	366	223	89	0	0	0
New Mexico	0	2	2	2	8	9	7	82	37	1	0	0
Arizona	0	5	5	56	232	232	12	220	8	0	1	1
Utah [2]	1	0	2	------	6	20	271	28	38	2	0	0
Nevada	0	0	------	3	1	------	51	7	------	2	0	------
PACIFIC												
Washington	3	1	1	1	11	11	915	70	81	11	0	0
Oregon	0	1	2	32	28	59	562	120	120	11	0	1
California	20	17	24	84	175	175	425	2,501	428	24	1	1
Total	285	323	421	4,327	5,667	5,667	13,444	14,351	14,031	330	60	60
5 weeks	1,680	1,804	2,250	21,748	22,592	22,592	49,545	50,679	50,679	[3] 1,612	290	275

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended February 6, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	Feb. 6, 1943	Feb. 7, 1942		Feb. 6, 1943	Feb. 7, 1942		Feb. 6, 1943	Feb. 7, 1942		Feb. 6, 1943	Feb. 7, 1942	
NEW ENG.												
Maine	0	0	0	19	15	18	0	0	0	1	0	0
New Hampshire	0	0	0	14	6	6	0	0	0	0	0	0
Vermont	0	0	0	12	6	6	0	0	0	0	0	0
Massachusetts	0	1	0	438	337	205	0	0	0	0	5	2
Rhode Island	0	0	0	41	13	10	0	0	0	0	0	0
Connecticut	0	1	0	85	54	77	0	0	0	0	2	2
MID. ATL.												
New York	3	1	1	463	445	490	0	0	0	3	6	6
New Jersey	0	2	2	100	130	175	0	0	0	3	0	1
Pennsylvania	2	2	0	309	298	468	0	0	0	5	4	8
E. NO. CEN.												
Ohio	0	0	0	391	376	376	3	0	1	0	2	1
Indiana	0	1	0	161	116	206	10	0	4	2	0	1
Illinois	0	2	2	216	260	579	1	2	2	2	2	3
Michigan [2]	1	1	1	111	224	298	0	0	3	2	6	1
Wisconsin	0	0	0	254	180	180	0	0	2	0	3	0
W. NO. CEN.												
Minnesota	1	0	0	76	97	136	0	0	16	0	1	0
Iowa	0	0	0	57	63	75	0	1	5	3	1	3
Missouri	1	1	0	109	131	114	0	0	2	1	1	1
North Dakota	0	1	0	1	30	30	0	0	0	0	0	0
South Dakota	0	0	0	20	54	25	1	0	6	0	0	0
Nebraska	2	0	0	30	34	34	1	1	1	0	0	0
Kansas	3	0	0	81	90	121	3	0	2	0	0	0
SO. ATL.												
Delaware	0	0	0	9	56	9	0	0	0	0	0	0
Maryland [2]	0	0	0	83	90	56	0	0	0	2	0	1
Dist. of Col	0	0	0	21	11	19	0	0	0	0	1	0
Virginia	0	0	0	38	48	40	0	0	0	2	3	3
West Virginia	1	0	1	34	60	50	0	0	0	0	0	0
North Carolina	0	1	0	63	68	53	0	0	0	1	0	0
South Carolina	0	2	2	8	9	9	0	1	0	3	0	1
Georgia	0	1	1	28	17	19	0	1	0	2	25	2
Florida	3	0	0	13	11	13	0	0	0	0	3	2
E. SO. CEN.												
Kentucky	1	0	1	46	84	84	1	4	3	0	0	0
Tennessee	1	4	0	40	84	67	0	0	0	1	3	1
Alabama	0	0	0	25	11	14	1	2	0	0	1	2
Mississippi [2]	1	0	1	12	7	10	0	2	1	0	3	3
W. SO. CEN.												
Arkansas	0	1	0	5	10	10	0	0	1	1	2	3
Louisiana	0	0	0	16	6	15	0	0	0	2	3	7
Oklahoma	0	0	0	14	25	31	1	1	1	0	1	1
Texas	3	3	0	90	49	80	4	2	5	3	3	10
MOUNTAIN												
Montana	0	0	0	14	38	35	0	0	0	0	1	0
Idaho	0	0	0	18	4	8	2	0	1	0	2	0
Wyoming [2]	0	2	0	70	20	8	0	0	0	0	0	0
Colorado	1	0	0	52	37	37	0	0	6	0	1	1
New Mexico	0	0	0	4	5	6	0	0	0	0	0	0
Arizona	1	1	0	10	9	9	0	0	1	0	0	1
Utah [2]	0	0	0	100	39	38	0	0	0	0	0	0
Nevada	0	0	-----	3	4	-----	0	0	-----	1	0	-----
PACIFIC												
Washington	0	0	1	28	25	54	0	0	0	1	0	1
Oregon	0	0	1	16	6	34	0	0	0	3	0	0
California	3	1	1	189	133	197	0	0	6	4	0	5
Total	28	29	21	4,037	3,925	4,868	28	17	71	48	85	85
5 weeks	164	138	138	18,187	18,045	21,356	155	84	390	249	400	403

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended February 6, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Whooping cough, Week ended—Feb. 6, 1943	Whooping cough, Week ended—Feb. 7, 1942	Whooping cough, Median 1938–42	Week ended Feb. 6, 1943: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENG.												
Maine	114	22	29	0	0	0	0	0	0	0	0	0
New Hampshire	14	4	4	0	0	0	0	0	0	0	0	0
Vermont	19	29	23	0	0	0	0	0	0	0	0	0
Massachusetts	207	236	186	0	0	0	0	1	0	0	0	0
Rhode Island	27	74	34	0	0	0	0	0	0	0	0	0
Connecticut	59	122	74	0	1	5	0	0	0	0	0	0
MID. ATL.												
New York	361	594	439	0	3	15	0	2	0	0	0	1
New Jersey	143	232	144	0	0	0	0	1	0	0	0	0
Pennsylvania	347	243	372	1	1	0	0	1	0	0	0	0
E. NO. CEN.												
Ohio	248	268	205	0	0	0	0	2	0	0	0	0
Indiana	61	39	23	0	0	0	0	0	0	0	1	0
Illinois	161	183	125	0	2	2	0	0	0	0	2	0
Michigan [2]	216	294	232	0	0	0	0	0	0	0	0	0
Wisconsin	241	327	175	0	0	0	0	1	0	0	0	0
W. NO. CEN.												
Minnesota	74	56	56	0	0	8	0	0	0	0	0	0
Iowa	30	42	31	0	0	0	0	0	0	0	0	0
Missouri	15	38	38	0	0	0	1	0	0	0	0	0
North Dakota	9	8	26	0	0	0	0	0	0	0	0	0
South Dakota	15	8	8	0	0	0	0	0	0	0	0	0
Nebraska	7	1	6	0	0	0	0	0	0	0	0	0
Kansas	41	41	41	0	0	0	0	0	0	0	2	0
SO. ATL.												
Delaware	5	2	3	0	0	0	0	0	0	0	0	0
Maryland [2]	47	61	64	0	1	0	0	0	0	0	0	0
Dist. of Col.	24	11	9	0	0	0	0	0	0	0	0	0
Virginia	105	65	65	0	0	0	19	0	0	0	2	0
West Virginia	67	55	55	0	0	0	0	0	0	0	0	0
North Carolina	177	224	231	0	1	1	0	0	0	0	1	3
South Carolina	70	71	71	0	1	0	0	0	0	0	0	2
Georgia	24	33	26	0	0	0	0	0	0	0	5	10
Florida	12	39	36	0	0	0	0	0	0	0	0	4
E. SO. CEN.												
Kentucky	26	122	71	0	0	0	0	0	0	0	1	0
Tennessee	76	41	46	0	0	0	0	0	0	0	1	1
Alabama	26	9	14	0	0	0	0	0	0	0	1	2
Mississippi [2]	------	------	------	0	0	0	0	0	0	0	1	1
W. SO. CEN.												
Arkansas	19	11	24	0	0	0	0	0	0	0	0	0
Louisiana	3	0	5	0	0	1	0	0	0	0	2	0
Oklahoma	14	8	8	0	0	0	0	0	0	0	0	0
Texas	357	119	119	0	2	99	0	5	0	0	1	81
MOUNTAIN												
Montana	32	25	21	0	0	0	0	0	0	0	0	0
Idaho	3	9	9	0	0	0	0	0	0	0	0	0
Wyoming [2]	2	1	2	0	1	0	0	0	0	0	0	0
Colorado	19	24	44	0	1	0	0	0	0	0	0	0
New Mexico	19	29	29	0	0	0	0	0	0	0	0	0
Arizona	1	72	26	0	0	0	6	0	0	0	0	0
Utah [2]	25	15	57	0	0	0	0	0	0	0	0	0
Nevada	12	7	------	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	20	114	113	0	0	0	0	0	0	0	0	0
Oregon	12	34	29	0	0	0	0	0	0	0	0	0
California	250	265	261	0	3	6	0	0	0	0	0	0
Total	3,856	4,327	4,246	1	17	137	26	13	0	0	20	55
5 weeks	19,739	21,701	21,336	------	------	------				------	------	------

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Delayed report from Maine for week ended Jan. 23, 1943, shows 10 cases of meningococcus meningitis, instead of 8.

WEEKLY REPORTS FROM CITIES

City reports for week ended January 23, 1943

This table lists the reports from 89 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga	0	0		1	1	1	7	0	9	0	0	2
Baltimore, Md	3	0	3	1	7	12	31	0	23	0	0	67
Barre, Vt	0	0		0	0	0	0	0	0	0	0	0
Billings, Mont	0	0		0	0	0	0	0	0	0	0	0
Birmingham, Ala	0	0	6	0	0	0	5	0	5	0	0	0
Boise, Idaho	0	0		0	0	0	0	0	0	0	0	0
Boston, Mass	0	0		0	140	0	19	0	106	0	0	41
Bridgeport, Conn	0	0	1	1	0	0	4	0	2	0	0	1
Brunswick, Ga	0	0		0	0	0	3	0	0	0	0	3
Buffalo, N. Y	1	0	1	1	97	0	11	0	9	0	0	47
Camden, N. J	5	0		0	40	0	3	0	3	0	0	2
Charleston, S. C	0	0	30	0	0	0	2	0	1	0	1	0
Charleston, W. Va	0	0		0	0	0	0	0	1	0	0	0
Chicago, Ill	3	0	2	1	97	5	35	0	79	0	0	69
Cincinnati, Ohio	0	0	1	2	29	0	3	0	31	0	0	4
Cleveland, Ohio	1	0	6	3	3	3	14	0	41	0	0	87
Columbus, Ohio	1	0	2	2	2	0	5	0	18	0	0	3
Concord, N. H	0	0		0	0	0	1	0	1	0	0	0
Cumberland, Md	0	0		0	0	0	0	0	0	0	0	0
Dallas, Tex	2	0	1	1	0	1	6	0	4	0	0	17
Denver, Colo	5	1	45	0	99	0	7	0	9	0	0	4
Detroit, Mich	1	0	1	3	15	5	22	0	34	0	0	151
Duluth, Minn	0	0		0	0	0	1	0	3	0	0	4
Fall River, Mass	0	0		0	4	0	4	0	6	0	0	18
Fargo, N. Dak	0	0		0	2	1	0	0	0	0	0	0
Flint, Mich	2	0		0	3	0	2	0	5	0	0	1
Fort Wayne, Ind	0	0		1	0	0	2	0	0	0	0	0
Frederick, Md	0	0		0	0	0	0	0	0	0	0	0
Galveston, Tex	0	0		0	0	0	1	0	1	0	0	0
Grand Rapids, Mich	0	0		0	1	0	2	0	2	0	0	3
Hartford, Conn	0	0		0	10	1	5	0	0	0	1	0
Helena, Mont	0	0		0	2	0	0	0	2	0	0	5
Houston, Tex	3	0	2	0	0	0	4	0	4	0	0	5
Indianapolis, Ind	1	0		0	157	2	12	0	40	0	1	9
Kansas City, Mo	1	0	1	2	4	2	14	0	35	0	0	3
Kenosha, Wis	0	0	1	0	2	0	0	0	2	0	0	5
Little Rock, Ark	0	0	2	0	0	0	7	0	0	0	0	0
Los Angeles, Calif	0	0	21	4	0	1	8	0	32	0	1	41
Lynchburg, Va	2	0		0	0	0	0	0	1	0	0	1
Memphis, Tenn	0	0	6	2	9	1	6	0	8	0	0	18
Milwaukee, Wis	0	0	2	2	105	0	4	0	113	0	0	41
Minneapolis, Minn	0	0		1	3	2	1	0	10	0	0	4
Missoula, Mont	0	0		0	0	0	0	0	0	0	0	0
Mobile, Ala	0	0	4	0	0	0	7	0	0	0	0	0
Nashville, Tenn	0	0		1	16	0	0	0	2	0	0	2
Newark, N. J	0	0	2	0	19	1	9	0	9	0	0	12
New Haven, Conn	0	0		0	4	0	4	0	2	0	0	7
New Orleans, La	1	0	4	4	2	2	13	0	4	0	2	1
New York, N. Y	22	0	24	2	65	28	88	0	229	0	2	74
Omaha, Nebr	0	0		0	0	0	1	0	3	0	0	1
Philadelphia, Pa	0	0	4	2	1,189	5	44	0	78	1	0	75
Pittsburgh, Pa	1	0	1	3	0	1	17	0	9	0	1	22
Portland, Maine	0	0	1	0	6	8	8	0	2	0	0	24
Providence, R. I	0	1	1	0	8	11	7	0	7	0	0	16
Pueblo, Colo	0	0		0	3	0	2	0	1	0	0	0
Racine, Wis	0	0		0	10	0	0	0	16	0	0	0
Raleigh, N. C	0	0		0	0	1	3	0	0	0	0	8
Reading, Pa	0	0		1	68	0	1	0	0	0	0	11
Richmond, Va	0	0	4	1	4	0	4	0	2	0	0	8

City reports for week ended January 23, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Roanoke, Va	0	0	------	0	0	0	0	0	1	0	0	1
Rochester, N. Y	1	0	------	0	10	2	7	0	5	0	0	39
Sacramento, Calif	1	0	------	0	3	4	5	0	9	0	0	11
Saint Joseph, Mo	0	0	------	0	0	0	6	0	0	0	0	0
Saint Louis, Mo	0	0	6	1	5	2	14	0	19	0	0	6
Saint Paul, Minn	0	0	------	1	3	0	7	0	3	0	0	38
Salt Lake City, Utah	1	0	------	0	92	1	0	0	25	0	0	13
San Antonio, Tex	4	0	1	2	0	0	11	1	1	0	0	2
San Francisco, Calif	0	0	4	0	14	3	11	0	18	0	0	31
Savannah, Ga	0	0	10	2	0	0	4	0	0	0	0	1
Seattle, Wash	2	0	------	0	30	0	9	0	4	0	0	4
Shreveport, La	1	0	------	0	0	0	9	0	0	0	0	0
South Bend, Ind	0	0	------	0	1	0	4	0	4	0	0	1
Spokane, Wash	0	0	------	0	154	1	1	0	2	0	0	0
Springfield, Ill	0	0	------	0	3	0	3	0	2	0	0	68
Springfield, Mass	0	0	------	0	10	0	0	0	74	0	0	0
Superior, Wis	0	0	------	0	0	0	1	0	1	0	0	4
Syracuse, N. Y	0	0	------	0	4	0	8	0	15	0	0	14
Tacoma, Wash	2	0	------	2	31	0	0	0	0	0	0	0
Tampa, Fla	0	0	4	0	1	1	2	0	2	0	0	3
Terre Haute, Ind	0	0	------	0	0	0	2	0	1	0	0	0
Topeka, Kans	0	0	---	1	12	0	4	0	4	0	0	1
Trenton, N. J	1	0	2	0	5	0	2	0	3	0	0	2
Washington, D. C	0	0	6	1	17	2	21	0	28	0	4	20
Wheeling, W. Va	0	0		0	1	0	1	0	1	0	0	3
Wichita, Kans	0	0	------	0	6	0	9	0	2	0	0	3
Wilmington, Del	0	0	------	0	2	0	4	0	1	0	0	3
Wilmington, N. C	0	0	------	1	5	0	2	0	4	0	0	10
Winston-Salem, N. C	1	0	------	0	0	0	1	0	1	0	0	6
Worcester, Mass	0	0	------	0	0	0	16	0	6	0	0	6
Total	69	2	212	53	2,635	110	621	1	1,240	1	13	1,202
Corresponding week 1942	87	2	293	42	1,730	18	466	4	1,218	0	16	1,350
Average, 1938–42	119	------	1,908	[1] 96	[2] 3,078	------	[1] 615	------	1,290	15	20	1,130

Anthrax.—Cases: New Orleans, 1; Philadelphia, 1.
Dysentery, amebic.—Cases: Los Angeles, 2, New York, 5; Philadelphia, 1.
Dysentery, bacillary.—Cases. Buffalo, 1; Detroit, 3; New York, 8.
Dysentery, unspecified.—Cases: Baltimore, 1; San Antonio, 5.
Tularemia.—Cases: Chicago, 1.
Typhus fever.—Cases: Brunswick, 1; Charleston, S. C., 3; Galveston, 1; Little Rock, 1; Los Angeles, 1; New Orleans, 1; Savannah, 1.

[1] 3-year average, 1940–42
[2] 5-year median.

PLAGUE INFECTION IN CALIFORNIA AND WASHINGTON

Plague infection has been reported proved in California and Washington as follows:

CALIFORNIA

Siskiyou County.—In a pool of 104 fleas from 7 ground squirrels, *C. douglasii*, taken on June 10, 1942, 6 miles east of Grenada.

WASHINGTON

Tacoma.—In a pool of tissue from 3 rats, *R. norvegicus*, taken January 13 and 14, 1943, in Tacoma, Pierce County, Wash.

FOREIGN REPORTS

ARGENTINA

Poliomyelitis.—According to information dated January 25, 1943, 317 cases of poliomyelitis were reported in Buenos Aires, Argentina, and 300 cases in the Province of Buenos Aires, for the period October 1 to December 15, 1942. The remainder of the country reported 74 cases of poliomyelitis for the year 1942.

CANADA

Provinces—Communicable diseases—Weeks ended January 2 and 9, 1943.—During the weeks ended January 2 and 9, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Week ended January 2, 1943

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	24	55	1	59	435		53	8	32	667
Diphtheria		11	5	17	4		2	1	1	41
Encephalitis, infectious							2			2
German measles				2	15		7		12	36
Influenza		23			1				40	64
Measles		16	1	20	119		26	1	42	225
Meningitis, meningococcus	1	1			3				2	7
Mumps		135	2	7	656		60	52	165	1,077
Poliomyelitis				1						1
Scarlet fever		5	5	50	111		20	15	24	230
Tuberculosis (all forms)	1	8	3	50	117		10	32	10	231
Typhoid and paratyphoid fever				3	4			2		9
Whooping cough		31		29	68		1	23	10	162

NOTE.—No figures are available for Manitoba for the above period.

Week ended January 9, 1943

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		24		191	423	69	41	16	58	822
Diphtheria		34	1	32	3	4		1		75
Dysentery (bacillary)				2					2	4
German measles		2			16		1		6	25
Influenza		2	2		8	4			21	37
Measles		1	3	163	70	13	46	1	10	307
Meningitis, meningococcus			1		5				2	8
Mumps		131		57	1,026	86	68	48	185	1,601
Poliomyelitis				1						1
Scarlet fever		8	6	137	130	6	9	33	19	348
Tuberculosis (all forms)	2	20	13	85	46	15	1	6	27	215
Typhoid and paratyphoid fever				8	1	1	1		1	12
Undulant fever				2						2
Whooping cough		14		162	89	24	1	14	24	328

CUBA

Habana—Communicable diseases—4 weeks ended January 9, 1943.—During the 4 weeks ended January 9, 1943, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	15		Poliomyelitis	1	
Leprosy	22		Scarlet fever	3	
Malaria	12		Tetanus	1	1
Measles	3		Tuberculosis	10	2
Paratyphoid fever	1		Typhoid fever	15	

Provinces—Notifiable diseases—4 weeks ended January 2, 1943.—During the 4 weeks ended January 2, 1943, cases of certain notifiable diseases were reported in the Provinces of Cuba, as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer		1	3	12		5	21
Chickenpox		1				3	4
Diphtheria	1	23	2	5	1	4	36
Malaria	148	18	1	50	10	773	1,000
Measles		1	4			5	10
Poliomyelitis		2	4	13	1	2	22
Scarlet fever		1					1
Tuberculosis	6	19	11	43	11	50	140
Typhoid fever	2	19	5	33	7	21	87
Whooping cough						2	2

[1] Includes the city of Habana

JAMAICA

Communicable diseases—4 weeks ended January 16, 1943.—During the 4 weeks ended January 16, 1943, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	1	3	Scarlet fever		1
Diphtheria	2	2	Tuberculosis	22	56
Dysentery	1	4	Typhoid fever	5	25
Erysipelas	3		Typhus fever		2
Leprosy		1			

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Belgian Congo—Costermansville Province.—During the week ended October 24, 1942, one case of plague with one death was reported in Costermansville Province, Belgian Congo

Smallpox

Turkey.—During the week ended January 16, 1943, 252 cases of smallpox were reported in Turkey.

Typhus Fever

Hungary.—During the week ended January 16, 1943, 13 cases of typhus fever were reported in Hungary.

Slovakia.—During the week ended January 9, 1943, 15 cases of typhus fever were reported in Slovakia

Turkey.—During the week ended January 16, 1943, 53 cases of typhus fever were reported in Turkey.

Yellow Fever

Belgian Congo—Stanleyville Province—Bondo.—On December 13, 1942, one death from yellow fever was reported in Bondo, Stanleyville Province, Belgian Congo.

Colombia—Intendencia of Meta.—On November 29, 1942, one death from yellow fever was reported in Intendencia of Meta, Colombia.

Nigeria—Port Harcourt.—On December 9, 1942, one suspected case of yellow fever was reported in Port Harcourt, Nigeria.

COURT DECISION ON PUBLIC HEALTH

Milk—inspection—city ordinance provision held invalid.—(California District Court of Appeal, 3rd District; *Meridian, Ltd., et al.* v. *Sippy, District Health Officer*, 128 P.2d 884; decided August 29, 1942.) An ordinance of the city of Stockton designated as the city health officer the district health officer of the San Joaquin health district, the boundaries of which district were identical with those of San Joaquin County. By the ordinance every person engaged in the production, processing, or distribution of milk for retail redistribution was required to obtain a permit from the health officer before selling, distributing, or offering for sale any milk in the city. The ordinance also provided: "In no case shall a permit be issued to any person, firm, association or corporation to sell or expose for sale or exchange, deliver or distribute any milk in the city of Stockton unless the dairy, source of supply or place of origin is regularly inspected by the health officer or his authorized representatives." The health officer of San Joaquin health district did not inspect dairies beyond the boundaries of his district and, as a result of the ordinance, no dairy, although approved by the State director of agriculture, could bring any market milk from outside the boundaries of San Joaquin County and sell it in the city of Stockton. The appellant corporation owned and operated a dairy in Stanislaus County. This dairy complied with all requirements of the State department of agriculture and the ordinances of San Joaquin County, and the appellant had been granted permits under the agricultural code by the milk inspection services of the cities of Oakland and Los Angeles and the city and county of San Francisco. This appellant desired to deliver milk from its dairy to a plant in Stockton for pasteurization and thereafter for resale through said plant and other authorized distributors in said city holding valid permits. On application therefor a permit was refused by the health officer of the San Joaquin health district because the said dairy was not regularly inspected by him. In an action the trial court upheld the validity of the ordinance, but the California District Court of Appeal held invalid that portion of the ordinance quoted above.

Section 491(b) of the State agricultural code provided that, whenever a milk producer or distributor sold or delivered within the jurisdiction of two or more cities or counties, the director of agriculture, after an investigation and consultation with the health officer of each city and county involved, should designate a county or city to conduct dairy and milk plant inspection. The said section further provided: "All market milk and dairy products so inspected may be sold and delivered within the jurisdiction of any county and city; provided, that applicable local ordinances of such county or city are not thereby

violated. The county or city designated by the director to render such inspection shall enforce all applicable local ordinances of each county and city into which such market milk and dairy products are sold or delivered." In compliance with this the director of agriculture had investigated and consulted with the health officers of certain cities, including Stockton, and had designated the health officer of Oakland to conduct the inspection of the appellant corporation's dairy. The quoted ordinance provision was held by the court to conflict with the above statutory declaration that "milk and dairy products so inspected may be sold and delivered within the jurisdiction of any county and city."

Another point passed on by the appellate court arose in connection with the authority conferred on municipalities by section 451 of the agricultural code to provide higher standards for grades of market milk than those provided by State law. The ordinance of Stockton did require higher standards than those required by the agricultural code, but the court, after reviewing the above-quoted portion of section 491(b), pointed out that a State permittee, if he sold milk in a city having an ordinance fixing higher standards, had to comply with those standards and that the State inspector was directed to enforce them. "Therefore, the State law provides a method which permits the free flow of whole milk into the market without unnecessary duplication of inspection without depriving the cities having higher standards of their full protection. This inspection by the designated health officer is State inspection. [Cases cited.] It must be presumed this officer will do his duty." Regarding the enforcement of local ordinances, mentioned in section 491(b), the court said that "to enforce" a law usually meant to cause the arrest and to coerce by "actual force and punishment" but that it did not necessarily imply this. It might mean "to give effect to, to cause to have force." "Section 491(b)," said the court, "deals with permits and it must mean that in issuing those permits the State 'will give force to' local ordinances or 'give effect to them'; therefore, that no permit will issue to sell milk in Stockton unless the municipal standard of requirements be so maintained. The coercion and force to be applied to violators still lies with the city."

The judgment of the lower court was reversed, the quoted portion of the ordinance of Stockton was held invalid, and the appellants were declared to have a right to carry on their respective businesses in Stockton upon compliance with the terms of the agricultural code and the higher standards required by said ordinance.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON . 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 58 FEBRUARY 19, 1943 NUMBER 8

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol 58 • FEBRUARY 19, 1943 • *No. 8*

A SELF-HELP SOLUTION OF STATE PERSONNEL PROBLEMS [1]

By JOSEPH W. MOUNTIN, *Assistant Surgeon General, United States Public Health Service*

More work—fewer workers. These four words describe the plight of almost every public health agency today. From all sides the cry is raised, "Our organization is being destroyed! We are losing our personnel—they are either going into the armed forces or leaving to take better jobs elsewhere!"

These crys are prompted by varying degrees of urgency. Some of them are hardly justified by actual circumstances and are really prayers that the lightning will not strike. Others are the protest of health officers who are just beginning to feel the pinch of the wartime manpower shortage. Still others sound ominously like the death rattle of agencies about to give up the ghost.

One gets the impression that the catastrophe broke suddenly, without previous warning. Yet this is far from the truth. From the outbreak of the war in Europe it was apparent that the United States would not escape some form of participation. Later events pointed to full participation and complete transformation from a peacetime to a war economy. The present crisis and its effects were foretold again and again by responsible Government spokesmen and analysts of public affairs. Today on every hand we see evidence of how little these warnings were heeded.

The failure of some health departments to adjust themselves to coming events may perhaps be attributed to a disproportionate sense of their own worthiness and essentiality. They believed that those responsible for manpower policies could not disregard their needs. Somehow the war would be fought without disturbing their personnel structure or program content. When the necessity of recruiting and training replacement personnel was pointed out, objections were raised. It was claimed that the requirements of public health work were such that no one could be inducted into the mysteries of the profession without extended training. Merit systems of personnel administration, many of which had not evolved beyond the discussion

[1] From the States Relations Division.

and preliminary paper-work stage, were held up as insurmountable obstacles to emergency adjustments. Many health officers stated the belief that the Federal Government should, could, and would help them through the crisis. They said, "The Government is taking our workers and putting them in military service—why shouldn't it replace them?" or, "The Government is responsible for our headaches. It is putting up big camps and war plants in our midst, and turning the community inside out. Why shouldn't the Government solve the problems it has created?" Indeed, the early steps taken by the United States Public Health Service to relieve the situation in certain critical areas were misinterpreted by some as an indication that the Federal Government intended to shoulder most of the burden.

When the President declared a national emergency the Public Health Service realized that serious local problems would be created for which the Federal Government would have to make special provisions. Accordingly, the Service obtained an appropriation to help meet certain emergency health and sanitation needs in areas where local resources were inadequate. An emergency corps of professional personnel, including physicians, engineers, nurses, and laboratory workers, was recruited. A special effort was made not to select experienced public health workers who were needed in the armed services and in State and local health departments where they were then employed. Consequently, the educational background of most of the recruits was limited to basic training in medicine, engineering, nursing, or allied fields. In order to provide these workers with a modicum of instruction in public health policy and practices, a series of 4-week orientation training courses was instituted. Approximately 700 recruits were trained in this manner. At the conclusion of their orientation training most of them were assigned to State health departments, from whence they were reassigned to duty in some 200 of the more critical war communities.

The purpose of this corps of Federal personnel was to level off some of the more outstanding peaks of need which might obstruct the progress of the war program. The purpose was not to ease the recruitment problems of the States or to assume the responsibilities of State and local health agencies. Therefore, it was hoped that the State health departments would organize recruiting and training programs of their own.

The need for greater self-reliance on the part of the States was emphatically brought out by the Administrator of the Federal Security Agency in his address to the Fortieth Annual Conference of the United States Public Health Service with the State and Territorial Health Officers in March 1942. No doubt the Administrator hoped that his remarks would stimulate some concerted plan of action, or at least an effort by some States to meet the situation individually.

The Surgeon General of the Public Health Service specifically called the attention of the Conference to the need for recruiting additional workers and to the necessity of adjusting State merit systems so that such personnel as were available could be employed for the duration of the emergency.

At long last, one State—North Carolina—has developed an organized plan. On January 4, 1943, the State Board of Health instituted its own orientation training course for public health workers recruited for emergency service within the State.

North Carolina's initiative is the more remarkable in view of the fact that it has not lost so high a percentage of its health personnel as many other States. Only 4 local health officers and 1 medical officer from the State health department staff have been lost to the armed services. One local health officer has resigned to enter private practice. Depletion of sanitarians has been more serious; out of a normal complement of 87 trained sanitarians in local health units, 28 have been lost, and of the normal State sanitation staff of 20, 7 have gone. Of the 332 public health nurses on duty in the State at the beginning of 1942, 71 have left for military service or other employment.

In organizing its recruiting and training program, North Carolina's first step was to make the necessary adjustments in its merit system. The following emergency classifications were established, subject to acceptance by the State merit system council and review by the Federal agencies contributing to budgets through which the personnel will be paid after their assignment to actual duty:

Local Health Officer IV (War Emergency).—Qualifications: (1) Graduation from a class A medical school and 1 year of internship in an approved hospital; (2) possession of a license to practice medicine in North Carolina or eligibility for such a license.

Junior Public Health Nurse (War Emergency).—Qualifications: (1) Education equivalent to 4 years of high school; (2) graduation from a school of nursing; (3) registration with the North Carolina State Board of Nurse Examiners.

Junior Sanitarian (War Emergency).—Qualifications: (1) Graduation from an accredited high school; (2) 5 years within the past 10 of successful full-time paid employment, preferably in a field involving contact with the public.

Junior Follow-up Worker in Venereal Disease Control (War Emergency).—Qualifications: (1) Graduation from an accredited high school; (2) 5 years within the past 10 of successful full-time paid employment, preferably in a field involving contact with the public.

Provision was made for abolition of the new classifications at the expiration of the present emergency or at such time as personnel can be found to meet the qualificational requirements for the regular classifications. This provision was considered necessary in order to protect the merit system against future encroachment.

The State health department then instructed its district nursing consultants and district sanitarians, as well as all local health officers, to seek likely candidates. The State nursing association provided a list

of nurses who might be available. The Vocational Rehabilitation Division of the State Board of Education submitted the names of persons with various types of physical disability which would not interfere seriously with the kind of work to be done. The Women's College at Greensboro suggested several women who had received special instruction in dietetics and home economics, and who were considered suitable candidates for the position of junior sanitarian. WPA service and clerical projects which were undergoing liquidation provided another source of recruits.

A total of 80 applications was received, divided as follows with respect to the various job categories: Physicians, 3; nurses, 29; sanitarians, 34; follow-up workers, 14. Applications were received from virtually every section of the State. Each candidate was interviewed by a district nurse or sanitarian, and applications were submitted to the State health department central office and the State merit system supervisor for review. From the list of applicants the following were selected: Physicians, 3; nurses, 14; sanitarians, 13; follow-up workers, 9.

It is interesting to note the ages and backgrounds of the nursing and subprofessional applicants who were accepted. The nurses ranged in age from 22 to 59, and included seven married, five single, and two widowed women. All but three of them had received their training in schools of nursing approved by the State Board of Nurse Examiners and about half of them had been trained in hospitals with a capacity of more than 100 beds. Actual postgraduate professional experience ranged from 2 months of general staff duty to 22 years of private duty nursing. Three nurses had some public health nursing experience, and one woman's background included 8 years of sanatorium duty, 1 year in the Navy Nurse Corps, 1 year of private duty, and 3 years of public health nursing.

The 21 sanitarian and follow-up worker recruits ranged in age from 23 to 57. Six of them had college training of from 1 to 4 years. Six had physical defects which barred them from military service. All except two were employed at the time they submitted their applications, but a majority were engaged in activities which were suffering wartime curtailment. Among the occupations included were salesmen (candy, electrical appliances, automobiles, refrigerators, insurance), construction contractor, meat market operator, home wax manufacturer, accountant, grocer, textile worker, city fireman, and a college student in mechanical engineering. There were several school teachers and WPA project supervisors. Among the latter was a woman sanitarian recruit with experience in institutional dietetics and school lunch programs. On the whole, the calibre of the recruits was considerably higher than had been expected in view of the known manpower shortage.

On January 4 the recruits reported to the State health department in Raleigh to begin their orientation course. The training program was conducted by the Division of County Health Work, and began with a 2-week period of classroom instruction, including lectures, demonstrations, motion pictures and slide films, group meetings and discussions, quizzes, and a final written examination. Lectures and other instruction were given by members of the State health department staff, officers of the United States Public Health Service, and members of the faculty of the University of North Carolina School of Public Health. The schedule for the 2-week period is given on the following page.

Throughout the 2-week course student participation in the program of instruction was encouraged. Discussion was stimulated through true-and-false quizzes, with the students called upon to defend the answers they gave. A noteworthy feature was the division of the class into two groups, each representing the staff of a local health department and each under the direction of one of the physician students. Each group was presented with a hypothetical community having specified resources and health problems, and then told to go ahead and organize its staff and activities for meeting these problems. The two groups met separately for 30 minutes prior to the daily classes, mapped out their methods of operation, and reported their hypothetical progress. At the end of the 2 weeks each group reported to the entire class and the reports were compared and discussed. This procedure introduced an element of competition and gave the students an opportunity to apply the information they gained from the lectures and classroom demonstrations.

At the end of 2 weeks the recruits were assigned to certain local health departments regularly used by the University of North Carolina School of Public Health as field training centers. Field training for the nurses consisted of demonstrations of bag technique, home visits, observation of various types of clinics and school health service programs, and familiarization with nursing records and reports. The sanitarians observed and assisted in typhus control programs, food and milk control, privy construction, water supply protection, and field inspection and correction of insanitary conditions reported to the local health units. The follow-up workers learned the technique of interviewing venereal disease patients and conducting epidemiological investigations. They also received field instruction in methods of venereal disease education and preparation and use of reports and records. All field training was directly supervised by members of the local health department staffs who reported the progress of each student to the State staff members in charge of training the respective groups.

As this article goes to press the field training course is nearing

North Carolina State Board of Health—Orientation Course for Emergency Personnel, January 4–16, 1943

	9:30–10:15	10:30–11:15	11:30–12:30	1:30–2:15	2:30–3:15	3:30–4:30
Monday, January 4	Registration	Introductory lecture by State health officer.	Lecture — Organization and functions of State board of health.	Film—"The Work of the U. S. Public Health Service."		Instructions regarding courses.
Tuesday, January 5	Lecture — Federal, State, and local relationships.	Lecture—Field relationships of State health department employees.	Lecture—Public health nursing on Federal, State, and local levels.	Lecture — Wartime sanitation activities.	Film—"Stream Pollution."	Group conferences (Nurses, sanitarians, follow-up workers).
Wednesday, January 6	Lecture — County health work.	Lecture—Work of the Division of Epidemiology.	Lecture—Work of the State laboratory.	Lecture—Work of the Division of Sanitary Engineering.	Lecture — Preventive medicine.	Group conferences
Thursday, January 7	Lecture — Public health nursing in the State.	Lecture—National organization of venereal disease control.	Lecture—State organization of venereal disease control.	Lecture—The venereal diseases.	Lecture — Venereal disease epidemiology and case-finding.	Venereal disease film—"Know For Sure."
Friday, January 8	Lecture—Cafe and hotel sanitation.	Lecture—Food sanitation		Film—"Eating Out"	Lecture—Rural sewage disposal.	Group conferences.
Saturday, January 9	Lecture—Oral hygiene services	Review quiz				
Monday, January 11	Lecture—Local health lepartments		Lecture—Special wartime health problems.	Lecture — Wartime nursing.	Lecture — Wartime sanitation.	Lecture — Wartime venereal disease control.
Tuesday, January 12	Lecture—Milk sanitation		Discussion—Milk sanitation.	Lecture—Typhus fever control.	Film—"Rodent Control"	Discussion — Typhus fever control.
Wednesday, January 13	Lecture—Health education.	Lecture and film on nutrition.	Lecture — Tuberculosis control.	Lecture — Industrial hygiene.	Lecture — Public health laws.	Group discussion on laws.
Thursday, January 14	Lecture — Public health nursing.	Lecture—Epidemiology	Lecture—Intestinal parasites	Group conferences		Individual conferences.
Friday, January 15	Lecture—Malaria control	T. V. A. Malaria film	Field assignments	Review questions in preparation for final examination.		
Saturday, January 16	Final examination					

completion. Students who complete the training course successfully will be assigned to local health departments. Most of them will be assigned to their home communities. They will be paid with funds already budgeted for salaries covering positions left vacant by those who have gone into military service or other employment. Salary scales lower than those for the regular classifications have been adopted. During the training period the students received a monthly stipend, a per diem allowance, and travel expenses.

While the North Carolina program cannot be evaluated fully until the actual achievements of the new personnel in the field are noted, it is believed that the results will be distinctly worth while. Members of the State staff and representatives of the Public Health Service who helped organize and conduct the training course were most favorably impressed with the quality of the personnel recruited and the way in which they reacted to the instruction. When the program was launched it was expected that a definitely substandard group would be enrolled. This did not prove to be the case, as can be seen by the education and background of the recruits. Indeed, a considerable proportion of them possess the qualities which will enable them, with the benefit of experience and further instruction, to become permanent members of the State and local health organizations.

This raises the possibility that public health organizations may be making a mistake by adhering uncompromisingly to an "all or none" attitude with regard to the educational requirements of personnel. The public health structure as it exists today was built and developed mainly by persons who might be termed "field hands." They grew up and went to school on the job. They had a general concept of what they were striving for, and on the basis of that concept they did their work. The present manpower shortage makes it necessary for health agencies once again to employ field hands and train them on the job. The process should be easier today than in former years because the general level of education has risen considerably.

Some health officers hesitate to fill wartime vacancies because they fear that after the war they will be confronted with returned service men and women seeking jobs in which others have managed to entrench themselves. This attitude is based on the assumption that postwar health programs will be frozen at prewar levels, and that there will be a surplus of qualified manpower. I do not believe that either of these assumptions is warranted. We are fighting this war not only to maintain our present degree of social security but also to guarantee that we shall have the right and the opportunity to extend that security in the future. Such extension will require more attention to public health than ever before, and health departments should expect to expand rather than suffer curtailment. Moreover, it is unfortunate but true that some of those now in military service will

not return, and others will be incapacitated. Still others will not wish to re-enter the field of public health; the war will have given them an entirely different outlook, and they will want to take up other occupations. And a considerable force of trained personnel will undoubtedly be needed abroad to help the liberated nations recover from the terrible ordeal they have been through.

All these considerations give special importance to the pioneer program undertaken in North Carolina. In summary, the chief features of this program are: (1) The State made a careful analysis of its personnel problem; (2) it established emergency classifications in its merit system; (3) it is striving to meet its requirements by recruiting its own citizens, finding employment for them prior to induction, and meeting the costs with funds budgeted and available for salaries; (4) it has organized a systematic training program which includes initial instruction, planned field training, and continuing supervision in local health departments.

The pattern of action thus established by North Carolina may well be studied by other States and emulated where conditions warrant.[1] Similar programs in other States would fortify the health departments for the increased responsibilities and tasks imposed by the war, and would preserve the framework of organization for more complete health services in the postwar era.

THE TOXICITY AND HISTOPATHOLOGY OF SOME AZO COMPOUNDS AS INFLUENCED BY DIETARY PROTEIN[2]

By M. I. Smith, *Chief Pharmacologist*, R. D. Lillie, *Senior Surgeon*, and E. F. Stohlman, *Assistant Pharmacologist, United States Public Health Service*

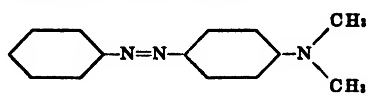
Kinosita's (*1*) discovery of the production of carcinomatosis of the liver of the rat by dimethylaminoazobenzene fed in a rice diet stimulated many investigators to search for an explanation of the phenomenon from the standpoint of chemical constitution in relation to carcinogenesis as well as from the point of view that dietary factors might influence this process. Nakahara and coworkers (*2*) showed that liver supplements had a counteracting effect against dimethylaminoazobenzene while Ando (*3*) ascribed similar results to yeast. Confirmatory reports have subsequently appeared concerning the protective action of liver (*4*), yeast (*5*), and millet (*6*). Miller and coworkers (*7*), using semisynthetic diets, were able to demonstrate a protective action with casein, liver, egg, and yeast proteins while xanthine, l-cystine, i-inositol, and choline had no such effects. The ineffectiveness of cystine has been confirmed by Mori (*8*), though

[1] After this article was written word was received that the Tennessee State Health Department would institute a similar training program beginning March 15.

[2] From the Division of Chemotherapy and Division of Pathology, National Institute of Health.

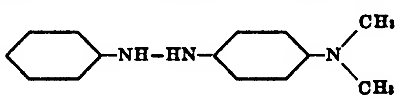
Gyorgy's (*9*) experiments would seem to indicate that cystine and choline together afford some protection. From the experiments of Kensler and associates (*10*) it would appear that at least two dietary factors, riboflavin and casein, are concerned with this antagonistic action. The most recent suggestion implicating biotin comes from Laurence (*11*); it is based on West and Woglom's (*12*) observation of high biotin content of cancerous tissues compared with normal. According to this, biotin deficiency might lead to retardation of the cancerous process, and in line with this DuVigneaud and associates (*13*) present evidence to indicate that biotin might play a precancerous rôle.

The question of chemical constitution in relation to liver injury produced by p-dimethylaminoazobenzene (I)



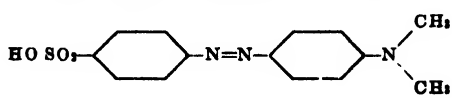
I

has also received considerable attention. Kinosita (*14*) has shown among other things that the hydrazo derivative (II) of



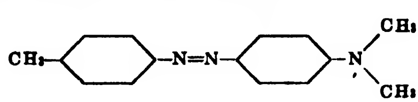
II

p-dimethylaminoazobenzene and the 4-sulfonic acid derivative (III) were devoid of the carcinogenic properties of the



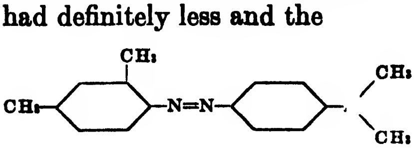
III

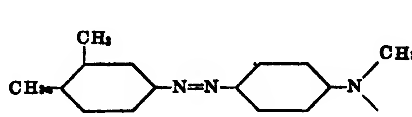
parent substance. Nagao (*15*) examined the effects of methylation of one of the benzene rings of p-dimethylaminoazobenzene and found that the 4-methyl derivative (IV) differed



IV

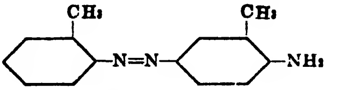
little from the parent substance while the 2-4-dimethyl derivative (V) had definitely less and the



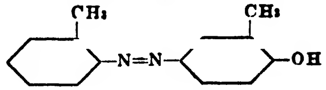


VI

3-4-dimethyl (VI) markedly less carcinogenic action than the parent substance. Law (*16*) reported greater carcinogenic action from the subcutaneous injection in mice of 4′-amino-2,3′-azotoluene (VII)

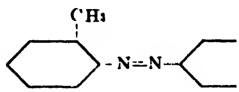


VII



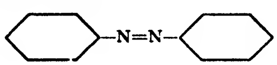
VIII

than from p-dimethylaminoazobenzene (I), 4′-hydroxy-2,3′-azotoluene (VIII) or 2,3′-azotoluene (IX).

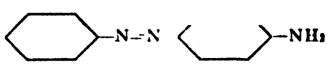


IX

The present report concerns the chronic toxicity and liver pathology of rats fed azobenzene (X), p-aminoazobenzene (XI), and p-dimethylaminoazobenzene (I)



X



XI

in a semisynthetic diet of low or high protein content. The drugs were dissolved in olive oil and incorporated into the food mixture consisting of casein or other protein as specified, McCollum's salt mixture No. 185 4, cod liver oil 2, olive oil 8, dried brewers yeast 5, and sufficient starch to make 100. The low protein diets contained 4 to 5 percent casein supplemented with 0.1 percent cystine in addition to the 3 percent protein derived from the yeast. No cystine was included in the diets with optimal or supraoptimal protein content. Wistar rats of either sex weighing 80 to 120 gm. were used. The animals were weighed at weekly intervals. In many cases hematological studies were made to ascertain the hemoglobin level, the reticulocyte count, and other abnormalities if present. In some of the experiments a liver function test was performed before sacrificing the animals. This was done by injecting intravenously 25 mg. per kg. rose bengal as a 0.5 percent aqueous solution and determining the degree of dye retention in the plasma at exactly one hour. The concentration of the dye in the plasma was measured spectrophotometrically as previously described (*17*). In a series of 20 control rats weighing from 60 to 315 gm. so treated with rose bengal the dye retention at one hour varied from 0.5 to 1.5 mg. percent with an average of 0.97 mg. percent and a standard deviation of 0.37. Retention in excess of 2.08 mg. percent ($0.97+3\times$standard deviation) should, therefore, be regarded as an indication of impaired liver function.

RESULTS

Azobenzene fed in the proportion of 0.1 percent proved so toxic that most animals died within a few days. The concentration of the drug had to be reduced to 0.06 percent to permit sufficiently long survival. The toxicity of the drug did not appear greater in the animals receiving low protein (4 percent casein) than in those receiving high protein (27 percent casein). Even at this low level of drug intake many animals died within a month. The hematological findings in these animals were essentially negative.

These rats developed rather regularly a peculiar hyaline degeneration in the liver. This was present in 21 of 23 rats killed after 25 to 63 days. The liver cells in the central one-third to one-half of the lobule presented changes varying from granular cytoplasmic oxyphilic to hyaline oxyphilic masses continuous directly with the more or less reticulated basophilic cytoplasm. In many areas these hyaline masses were rounded and separated from the rest of the cytoplasm, lying free within vacuoles. This hyaline material tinges only slightly with methyl violet, basic fuchsin, or Sudan IV. It is pale blue green with toluidin blue. It stains pink with eosin-polychrome methylene blue. The lack of metachromasia to methyl violet is against an amyloid nature of the material.

Nine additional rats were fed as above for 47 days and then returned to an 18 percent casein, azobenzene-free diet for 30 days. When killed, their livers contained no hyaline material. The Kupffer cells, however, showed more or less swelling and hemosiderosis in both groups.

The spleens in the azobenzene-fed animals were generally enlarged, their follicles showed no consistent significant alterations, the blood content of the pulp was usually about normal, and there was generally a fairly marked peritrabecular to diffuse infiltration by large basophilic cells, the nuclei of which were more or less pachychromatic. These are myeloid cells, probably of the erythroblastic series, as rather numerous normoblasts were generally present elsewhere in the pulp. Inconstantly, numbers of megakaryocytes were noted. In the rats which were given a recovery period of 30 days on normal diet, this somewhat marked erythropoietic reaction was reduced to a slight reaction. In all rats, including the "recovery" group, there was a moderate to marked hemosiderosis of the pulp reticuloendothelium comparable in grade in the two series.

The renal convoluted tubules almost regularly showed basally striated, fat-free epithelium with moderate to marked accumulation of finely granular brown pigment in the epithelial cells. This pigment usually remained brown with eosin methylene blue and did not tinge with Sudan IV. In a variable proportion of individual tubules (from

one-fourth to practically all) this pigment was deep blue with acidulated potassium ferrocyanide solution, remaining brown in the rest. Either all the pigment in a given tubule, or none of it, appeared to react. Iron-positive pigment was more plentiful in the distal tubules. As previously suggested (*19*) this iron-negative brown pigment probably represents a desiderized hemosiderin. Miller (*20*) has adopted a similar view in regard to the renal pigmentation of lead poisoning, and Edwards and White (*21*) in regard to that of p-dimethylaminoazobenzene poisoning. In the animals in the "recovery" group the renal pigmentation was much decreased in amount, often not detected without the ferrocyanide reaction, and with this it involved perhaps an eighth of the tubules on an average in place of about five-eighths in the azobenzene group.

In most of the azobenzene animals there was seen the nodular papillary hyperkeratosis of the proventriculus of the stomach, which is commonly seen in low protein, yeast-containing diets regardless of presence or absence of toxic substances in the diet. This was not noted in the animals which had been given an adequate diet for the last 30 days after a low protein, azobenzene regime.

Summarizing, azobenzene fed to rats on a low protein diet produces a centrolobular hyaline alteration of liver cells, a more or less marked splenic erythropoietic reaction, and a hemosiderosis of spleen, liver, and kidneys. During recovery, the hepatic lesions disappear without trace, the erythropoietic reaction is greatly decreased, the hemosiderosis decreases most in the liver and kidney, least in the spleen.

Para-aminoazobenzene appeared to be less toxic in rats since it was generally tolerated up to 0. 1 percent. This substance readily produced anemia in rats characterized by anisocytosis with numerous macrocytes, polychromatophils, reticulocytes, Howell-Jolly bodies, and a few normoblasts. The hemoglobin level was often reduced to as low as five gm. The anemia was especially pronounced in the low protein group. A series of rats fed this substance at a level of 0.1 percent in both low and high protein diets were sacrificed at from 35 to 41 days for histologic study.

As with azobenzene, the liver cells of the low protein group in the central one-third to one-half of the lobule presented granular cytoplasmic oxyphilia, grading over to hyaline oxyphilic masses and to globules of similar material lying within vacuoles in the cytoplasm. The Kupffer cells often presented swelling and hemosiderin pigmentation.

In the spleen the follicles showed no important changes. The pulp showed fairly marked peritrabecular to diffuse infiltration with large basophilic cells and rather numerous normoblasts around them. At 6 weeks, this erythropoietic reaction was somewhat similar in grade in the high and low protein groups. Hemosiderosis of the pulp reticuloendothelial cells was also marked in all animals.

With p-aminoazobenzene the epithelium of the renal convoluted tubules was usually fat free, basally striated, and more or less heavily pigmented with granular brown pigment. This pigment was iron positive in some tubules and iron negative in others. The renal hemosiderosis was possibly somewhat more marked in the low protein diet group, but was present also in considerable grade in the high protein diet group.

The same papillary keratosis of the forestomach seen in other animals on low protein, yeast-containing diets was present also in the low protein group of p-aminoazobenzene-fed rats.

Summarizing, p-aminoazobenzene fed to rats on a low protein diet produces a centrolobular hyaline alteration of liver cells, a considerable degree of anemia, and a more or less marked splenic erythropoietic reaction with hemosiderosis of the spleen, kidneys, and liver. Both the anemia and the liver injury may be largely overcome by high dietary protein. The relative effects of p-aminoazobenzene on the respective diets are shown in tables 1 and 2. Abnormal rose bengal retention was present in 10 of 11 animals on the low protein diet, and in only 4 of 11 on the 27 percent casein diet. The morphological alterations in the liver, as noted in the tables, were generally consistent with the functional changes.

Para-dimethylaminoazobenzene.—This substance was fed at a level of 0.1 percent. In conformity with previous reports on this subject hepatic cirrhosis was observed within 30 to 50 days with a rapidly rising incidence of tubular or solid or both types of adenomatosis, so that by 80 to 100 days this is usually almost constant when para-dimethylaminoazobenzene is fed in a diet containing 7 to 8 percent protein. However, both the incidence and especially the extent of

TABLE 1.—*Experiments with p-aminoazobenzene fed at a level of 0.1 percent in a diet containing 4 percent casein supplemented with 0.1 percent cystine*

Number	Weight		Days	Rose bengal retention Mg. percent at 60′	Microscopic pathology[1]	
	Initial	Final			Hepatic hyaline degeneration	Splenic myelosis
1	108	80	35	7.45	++	+
2	100	78	35	4.07	++	±
3	110	90	35	5.23	++	++
4	112	98	35	3 29	+	+
5	110	116	35	3.10	+	++
6	118	108	35	4 60	+	+
7	100	78	36	1.00	+	+
8	108	86	36	2.52	++	+
9	92	78	36	4.70	+	+
10	108	96	37	3.01	+	++
11	112	106	37	4.79	++	++

[1] In this and subsequent tables:
— designates none.
± slight or doubtful.
\+ definite.
++ marked.

adenomatosis of the liver are low and the survival is decidedly better on the high protein (37 percent casein) diet. Thus, in one series of 9 rats on the low protein diet surviving 120 to 150 days all showed extensive involvement; in a parallel series of 12 rats on 37 percent casein, 8 showed microscopic evidence of adenocarcinoma, 2 showed only slight evidence, and 2, none. This was repeated in another series of experiments, as shown in tables 3 and 4, with the result that 5 of 11 animals on the low protein diet showed extensive carcinomatosis of the liver within 47 to 133 days with abnormal rose bengal retention in all cases. In a parallel series on the high protein diet, only one animal showed a somewhat elevated rose bengal concentration in the plasma though microscopic evidence of carcinoma was present in 4 out of 10. Liver cirrhosis was noted in all animals of both groups.

The favorable influence of casein prompted an investigation of the effects of three other proteins. Yeast was tried because of its high nutritive value and high biotin content. Egg white was used for its avidin content capable of inactivating what biotin there might be in

TABLE 2.—*Experiments with p-aminoazobenzene fed at a level of 0.1 percent in a diet containing 27 percent casein*

Number	Weight		Days	Rose bengal retention Mg. percent at 60′	Microscopic pathology	
	Initial	Final			Hepatic hyaline degeneration	Splenic myelosis
1	86	65	38	3 19	+	+
2	86	102	38	1.34	−	+
3	90	88	40	.57	+	++
4	94	108	40	1.42	±	+
5	92	155	40	1.11	−	++
6	82	126	41	3.19	±	++
7	84	150	41	.87	−	++
8	92	142	41	2.37	±	++
9	82	138	41	2 84	±	++
10	84	124	41	1 69	±	++
11	82	78	41	1 78	−	+

TABLE 3—*p-Dimethylaminoazobenzene fed to rats at a level of 0.1 percent in a diet containing 5 percent casein plus 0.1 percent cystine*

Number	Weight		Days	Rose bengal retention Mg. percent at 60′	Microscopic liver pathology			
	Initial	Final			Hyaline degeneration	Cirrhosis	Duct proliferation	Adenocarcinomatosis
1	100	64	110	10.45	+	+	+	±
2	130	76	110	3 37	−	+	−	−
3	100	78	110	8.63	−	+	+	+
4	100	65	110	14.89	−	+	+	+
5	108	68	47	13.15	−	+	±	−
6	100	78	124	6.99	+	+	+	+
7	124	88	124	13.56	+	+	+	+
8	110	80	63	20 00	−	+	+	−
9	106	92	63	12.77	−	+	−	−
10	130	132	133	7.45	+	+	+	+
11	130	124	133	7.45	+	+	+	−

TABLE 2.—*Change in the number of county and district health units and in the number of counties served in such units in the continental United States from December 31, 1935, to June 30, 1942*

Type of health unit	County and district health units				Counties served in health units			
	Number of units in 1935	Number of units in 1942	Increase from 1935 to 1942		Number of counties in 1935	Number of counties in 1942	Increase from 1935 to 1942	
			Number	Percent			Number	Percent
All types	561	975	414	73.8	762	1,828	1,066	139.9
Single counties	486	660	174	35.8	486	660	174	35.8
Local districts	41	187	146	356.1	124	469	345	278.2
State districts	34	128	94	276.5	152	669	547	195.4

TABLE 3.—*Change in the number of county and district health units and in the number of counties served in such units in the continental United States from June 30, 1941, to June 30, 1942*

Type of health unit	County and district health units				Counties served in health units			
	Number of units in 1941	Number of units in 1942	Increase from 1941 to 1942		Number of counties in 1941	Number of counties in 1942	Increase from 1941 to 1942	
			Number	Percent			Number	Percent
All types	927	975	48	5.2	1,668	1,828	160	9.6
Single counties	662	660	-2	-.3	662	660	-2	-.3
Local districts	153	187	34	22.2	426	469	43	10.1
State districts	112	128	16	14.3	580	699	119	20.5

sary for adjacent counties to combine their resources and make joint use of available personnel. Moreover, in many areas the district form of organization is better suited than the county form to the rendering of service on a true community basis, since the boundaries of the local social and economic unit often transcend county lines. Wherever district health units are formed for the purpose of providing service to a unified and cohesive community group, the step must be regarded as a progressive one. Nevertheless, it should be pointed out that many district organizations, notably the State-district units, comprise an area too extensive for the rendering of adequate local service.

The current trend which is not specifically reflected by the data here presented is the combination of part-time county and municipal health organizations to form full-time county-city units. This, too, is an indication of a disposition to shape the pattern of health organization according to community needs rather than arbitrarily imposed political jurisdictions. Such combination usually results in a better type of service, and it can frequently be effected with little or no increase in expenditures.

Table 4 provides a comparison of the status of full-time local health service on December 31, 1935, and June 30, 1942.

Progress in the development of adequate local health services continues to receive its chief impetus from the Federal financial assistance

Table 4.—*Distribution of county and district health units and counties served in such units on June 30, 1942, and changes in the number of units and of counties served therein from December 31, 1935, to June 30, 1942, by States in the continental United States*

	All county health units						Single county units			Local district units						State district units					
	Number of units			Number of counties served						Number of units			Number of counties served			Number of units			Number of counties served		
	1942	1935	Change	1942	1935	Change	1942	1935	Change[1]	1942	1935	Change[1]	1942	1935	Change[1]	1942	1935	Change[1]	1942	1935	Change[1]
Total	975	561	414	1,528	762	766	660	486	174	157	41	146	469	124	345	128	34	94	699	152	547
Alabama	60	56	4	67	56	11	53	56	−3	7		7	14		14						
Arizona	5	4	1	5	4	1	5	4	1												
Arkansas	27	17	10	48	19	29	16	1		11	1	10	32	3	29						
California	26	16	10	27	16	11	25	16	9	1		1	2		2						
Colorado	3		3	4		4	2		2	1		1	2		2						
Connecticut																					
Delaware	3	3		3	3											3	3		3	3	
Dist. of Columbia																					
Florida	25	3	22	34	3	31	17	3	14	8		8	17		17						
Georgia	52	28	24	159	31	128	36	26	10	10	2	8	23	5	18	6		6	100		100
Idaho	5		5	10		10	3		3	2		2	7		7						
Illinois	21		21	100		100	4		4							17		17	96		96
Indiana	9		9	46		46	1		1							8		8	45		45
Iowa	14	1	13	99	1	98	4	1	3							10		10	95		95
Kansas	12	3	9	15	3	12	11	3	8							1		1	4		4
Kentucky	65	76	−11	95	76	19	41	76	−35	24		24	54		54						
Louisiana	47	34	13	53	34	19	41	34	7	6		6	12		12						
Maine	6	6		16	15	1										6	6		16	15	1
Maryland	23	23		23	23		23	23													
Massachusetts	10	3	7	13	4	9	1	2	−1	1	1		[2] 2	[2] 2		8		8	10		10
Michigan	44	22	22	66	40	26	32	15	17	12	7	5	34	25	9						
Minnesota	4	1	3	28	1	27		1	−1							4		4	28		28
Mississippi	56	25	31	65	25	40	50	25	25	6		6	15		15						
Missouri	22	5	17	112	5	107	13	5	8							9		9	99		99
Montana	5	3	2	5	3	2	5	3	2												
Nebraska	5		5	12		12	1		1	3		3	6		6	1		1	5		5
Nevada	1		1	1		1	1		1												
New Hampshire	1		1	2		2										1		1	2		2
New Jersey	8	5	3	17	11	6	2		2							6	5	1	15	11	44
New Mexico	10	10		31	31					10	10		31	31							

See footnotes at end of table

TABLE 4.—*Distribution of county and district health units and counties served in such units on June 30, 1942, and changes in the number of units and of counties served therein from December 31, 1935, to June 30, 1942, by States in the continental United States*—Continued

	All county health units						Single county units			Local district units						State district units					
	Number of units			Number of counties served						Number of units			Number of counties served			Number of units			Number of counties served		
	1942	1935	Change [1]	1942	1935	Change [1]	1942	1935	Change [1]	1942	1935	Change [1]	1942	1935	Change [1]	1942	1935	Change [1]	1942	1935	Change [1]
New York	25	20	5	59	57	2	6	5	1							19	15	4	53	52	1
North Carolina	58	39	19	83	48	35	43	35	8	15	4	11	40	13	27						
North Dakota	2		2	7		7	1		1							1		1	6		6
Ohio	51	39	12	53	39	14	49	39	10	2		2	4		4						
Oklahoma	26	2	24	39	2	37	18	2	16	8		8	21		21						
Oregon	18	6	12	20	6	14	16	6	10	2		2	4		4						
Pennsylvania	11		11	22		22										11		11	22		22
Rhode Island	3		3	5		5										3		3	5		5
South Carolina	33	22	11	45	23	22	22	21	1	11	1	10	23	2	21						
South Dakota	4		4	10		10	2		2	2		2	8		8						
Tennessee	51	35	16	66	40	26	38	30	8	13	5	8	28	10	18						
Texas	39	7	32	61	9	52	26	6	20	13	1	12	35	3	32						
Utah	6	1	5	28	1	27	1	1								5		5	27		27
Vermont																					
Virginia	33	19	14	49	40	9	23	10	13	10	9	1	26	30	−4						
Washington	12	8	4	17	8	9	8	8		4		4	9		9						
West Virginia	21	14	7	36	14	22	16	14	2	5		5	20		20						
Wisconsin	12	5	7	71	71		3		3							9	5	4	68	71	−3
Wyoming	1		1	1		1	1		1												

[1] Minus sign denotes decrease

[2] Includes town in Middlesex and Worcester Counties

granted to States since February 1936, under the terms of Title VI of the Social Security Act and since July 1938, under the terms of the Federal Venereal Disease Control Act. During the fiscal year 1942, however, an additional factor of great influence was the provision by the United States Public Health Service of professional health and sanitation personnel to communities which were not able to cope with the health problems arising out of the war emergency. With the aid of such personnel some form of full-time health service has been provided to practically every major war area in the United States. In some instances new units have been established and staffed largely with Public Health Service personnel assigned to the States. In others the staffs of existing units have been augmented in accordance with emergency needs. The scope and effect of this form of Federal aid is indicated by the fact that on June 30, 1942, a total of 515 Public Health Service personnel was engaged in emergency field duty in approximately 250 military or war-industry areas throughout the United States.

The efforts now being made to meet emergency needs with diminishing human and material resources are providing valuable lessons with regard to the most effective methods of operation. Under the pressure of events, long-standing inertia is being broken down and a "good neighbor" policy concerning the utilization of health personnel and facilities is more and more in evidence Undoubtedly, the benefits of such a policy will be sufficiently manifest to exert a strong influence in the determination of future methods and forms of organization.

EXPERIMENTAL ROCKY MOUNTAIN SPOTTED FEVER: RESULTS OF TREATMENT WITH CERTAIN DRUGS [1]

By Edward A. Steinhaus, *Associate Bacteriologist*, and R. R. Parker, *Director, Rocky Mountain Laboratory, United States Public Health Service*

In 1939, Topping (*1*) reported that Prontosil and sulfapyridine are of no apparent value for the treatment of Rocky Mountain spotted fever in guinea pigs. Recent studies have led the authors to the same conclusion with respect to sulfathiazole, sodium sulfathiazole, sulfaguanidine, sulfadiazine, Atabrine, and tyrothricin.[2]

A highly fatal western Montana strain of Rocky Mountain spotted fever was used. The dosages of each drug varied according to its degree of toxicity. In general at least 3 dosages were selected and these were administered once, twice, or three times daily. Test data, results, and variations in procedure are presented in table 1.

---

[1] Contribution from the Rocky Mountain Laboratory (Hamilton, Mont), National Institute of Health.

[2] The authors wish to thank the following concerns for furnishing the drugs used in this investigation. Winthrop Chemical Co (sulfathiazole, sodium sulfathiazole, Atabrine), Lederle Laboratories (sulfaguanidine), Merck and Co. (tyrothricin), and Abbott Laboratories (sulfadiazine).

TABLE 1.—*Data concerning administration of certain drugs for treatment of Rocky Mountain spotted fever in laboratory animals*

Drug and route of administration	Number of animals	Dosage in grams	Doses per day	Number of days at least one animal treated	Days after inoculation treatment initiated	Comments
Sulfathiazole (oral)	2	0 03	1	7	2	No apparent value.
	2	.03	3	8	2	Do.
	2	.07	1	7	2	Do.
	4	.07	3	10	2-2 days after 2-same day	Do. Do.
	2	.15	1	8	2	Do
	4	.15	3	10	2-2 days after 2-same day	Do Do
	2	.3	3	10	same day	Do
Sodium sulfathiazole (subcutaneous).	1	.05	1	7	2	Do.
	1	.05	2	7	2	Do
	1	.10	1	7	2	Do.
	1	.10	2	7	2	Do.
	2	.10	2	9	same day	Do
	1	50	1	7	2	Do
Sulfaguanidine (oral)	2	05	1	9	same day	Do.
	2	05	2	8	do	Do.
	2	.10	1	8	do	Do.
	2	10	2	8	do	Do
	2	50	1	4 and 7	do	Drug toxic, animals dead on fourth and seventh days.
	2	.50	2	4 and 5	do	Drug toxic, animals dead on fourth and fifth days.
Sulfadiazine (oral)	2	.04	1	10	do	No apparent value.
	2	.04	3	10	do	One died on second day—cause unknown.
	2	.08	1	11	do	No apparent value
	2	.08	3	10	do	Do
	2	20	1	10	do	Do
	2	.20	3	10	do	Do
Atabrine (oral)	2	.01	1	10	1	Do.
	2	.01	2	10	1	Do
	2	.05	1	11	same day	Do.
	2	.05	2	11	do	Do
	4	.1	1	11	2-same day 2-next day	1 died on sixth day following administration of drug
	4	.1	2	11	2-same day 2-next day	3 died on fourth to eighth day probably due to drug.
	2	.2	1	12	1	1 died on seventh day. Other animal died on twelfth day
	2	.2	2	3	1	1 died on third day. Other animal died on second day
	1	.4	1	3	1	Dead on third day.
Tyrothricin (intraperitoneal).	2	.002	1	11	same day	Dead on tenth and thirteenth days.
	2	.002	2	8	do	Dead on eighth and ninth days
	2	.01	1	6	do	Dead on fifth and seventh days.
	2	.01	2	6	do	Dead on seventh day.
	2	.1	1	1	do	Dead on second day.
	2	.1	2	1	do	Do.
Tyrothricin (oral)	2	.002	1	10	do	Dead on eleventh day.
	2	.002	2	12	do	1 dead on tenth day.
	2	.01	1	11	do	1 dead on eleventh day.
	2	.01	2	12	do	Dead on twelth and fourteenth days.
	2	.1	1	6	do	Dead on fifth and sixth days
	2	.1	2	7	do	Dead on second and seventh days

NOTE: Rabbits used in Atabrine tests; guinea pigs in all others. Control animals receiving only drugs showed no ill effects except as indicated in "comments" column. Control animals receiving only virus showed typical spotted fever.

REFERENCE

(1) Topping, N. H.: Experimental Rocky Mountain spotted fever and endemic typhus treated with Prontosil or sulfapyridine. Pub. Health Rep., 54: 1143–1147 (1939).

TRIATOMA SANGUISUGA (LeCONTE) AND *TRIATOMA AMBIGUA* NEIVA AS NATURAL CARRIERS OF *TRYPANOSOMA CRUZI* IN TEXAS [1]

By DORLAND J. DAVIS, *Passed Assistant Surgeon, United States Public Health Service*, THEODORE MCGREGOR, *Entomologist, Bureau of Laboratories, Texas State Department of Health*, and THELMA DESHAZO, *Bacteriologist, Bureau of Laboratories, Texas State Department of Health*

American trypanosomiasis, or Chagas' disease, was first described in Brazil by Carlos Chagas in 1909 (*1*) and was shown to be caused by the protozoan flagellate *Trypanosoma cruzi*, and to be transmitted by a blood-sucking insect of the family Reduviidae, or cone-nosed bugs. In the United States six species of this insect group have been reported naturally infected with *Trypanosoma cruzi*. They are: *Triatoma protracta* Uhler (*2*), *Triatoma uhleri* Neiva (*2*), *Triatoma gerstaeckeri* (Stal) (*3*), *Triatoma heidemanni* Neiva (*4*), *Triatoma longipes* Barber (*5*), and *Triatoma protracta woodi* Usinger (*5*).

This report adds two more species, *Triatoma sanguisuga* (LeConte), and *Triatoma ambigua* Neiva, to those already recorded as harboring the parasite. Brumpt (*6, 7*) experimentally infected *Triatoma sanguisuga* with *Trypanosoma cruzi*, and Packchanian (*8*) has similarly infected *Triatoma ambigua* (*T. sanguisuga ambigua*) with this trypanosome.

During the study in 1942 of the potential problem of American trypanosomiasis in Texas conducted cooperatively by the United States Public Health Service and the Texas State Department of Health, several hundred specimens of *Triatoma* (commonly called bloodsuckers or kissing bugs) of various species were collected in different parts of the State.[2] Interested persons who found the insects about their homes submitted many of them. The others were collected chiefly from nests of the wood rat (*Neotoma micropus*).

Microscopical examinations were made of fecal material expressed from the digestive tract of nine specimens of *T. sanguisuga* and six specimens of *T. ambigua* while they were alive. Many crithidia and metacyclic trypanosome forms were found in four of the former and in two of the latter species. The specimens of *T. sanguisuga* which harbored the parasites were from Matagorda and Dimmit Counties, and the infected specimens of *T. ambigua* were from Uvalde County.

A saline suspension of the dejecta from each positive insect was inoculated intraperitoneally into young, laboratory-reared desert mice (*Peromyscus eremicus*). One to three animals were injected with

[1] From the Division of Infectious Diseases, National Institute of Health, and the Bureau of Laboratories, Texas State Department of Health.

[2] H. G. Barber of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, made the specific determinations. W. H. Ewart of the Texas Agricultural Experiment Station at Winter Haven, Texas, collected many of the specimens

material from each bug, a total of five mice being inoculated from the positive specimens of each species.

Eight to sixteen days later trypanosomes were found in fresh blood films of all the mice. At this time there were 1 or 2 organisms per 100 microscopic fields (4 mm. objective and 10X ocular), and in mice surviving until the thirtieth day there were 100 to 200 trypanosomes per 100 fields. They were actively motile and twisted and writhed rapidly, but did not progress across the microscopic field. Thin blood films stained with Leishman's stain showed trypanosomes morphologically identical to a known strain of *Trypanosoma cruzi* recovered from a human case in Panama.[3]

Of the five mice inoculated with the infected fecal material from the specimens of *T. sanguisuga*, four were sacrificed between the twenty-first and thirty-seventh day after injection, and one was found dead on the thirteenth day. Histological examinations of heart muscle, stained with Romanowsky stain or hemotoxylin and eosin, revealed the characteristic leishmania forms in two animals, extensive lymphocytic interstitial infiltration in one, and slight infiltration in the fourth. Heart blood from two of these animals was inoculated into young desert mice which showed trypanosomes in their peripheral blood on the eighth day.

Five mice inoculated with infected fecal material from two specimens of *T. ambigua* were sacrificed between the seventeenth and twenty-third day, and histological examinations showed the leishmania forms in the heart muscle fibers of all of them. A young wood rat (*Neotoma micropus*) was inoculated with blood from one of them, and its blood subsequently was found to contain the trypanosomes.

REFERENCES

(*1*) Chagas, C.: Nova tripanosomiaze humana. Mem. Inst. Oswaldo Cruz 1:159 (1909).

(*2*) Kofoid, C. A., and Whitaker, B. C.: Natural infection of American human trypanosomiasis in two species of cone-nosed bugs, *Triatoma protracta* Uhler and *Triatoma uhleri* Neiva, in the western United States. J. Parasitol., **22**:259 (1936).

(*3*) Packchanian, A.: Natural infection of *Triatoma gerstakeri* with *Trypanosoma cruzi* in Texas. Pub. Health Rep., **54**: 1547 (1939)

(*4*) Packchanian, A.: Natural infection of *Triatoma heidemanni* with *Trypanosoma cruzi* in Texas. Pub. Health Rep , **55**: 1300 (1940).

(*5*) Wood, S. F.: New localities for *Trypanosoma cruzi* Chagas in southwestern United States. Am. J. Hyg., **34**: Section C, 1 (1941).

(*6*) Brumpt, E.: Réduvides de l'Amérique du Nord capables de transmettre le *Tryp. Cruzi* Bull. Soc. Path. Exot., **7**: 132 (1914).

(*7*) Brumpt, E.: Maladie de C. Chagas, au Brésil. Mode de transmission, origine, conditions qui déterminent sa répartition actuelle. Bull. Acad. de Méd., **81**: 251 (1919).

(*8*) Packchanian, A.: Experimental transmission of *Trypanosoma cruzi* infection in animals by *Triatoma sanguisuga ambigua*. Pub. Health Rep., **55**: 1526 (1940).

---

[3] The authors are indebted to C. M Johnson of the Gorgas Memorial Laboratory, Panama, for this train.

PUBLIC HEALTH SERVICE PUBLICATIONS

A list of publications issued during the period July–December 1942

The following is a list of publications of the United States Public Health Service issued during the period July–December 1942.

The purpose of the publication of this list is to provide a complete and continuing record of Public Health Service publications, for reference use by librarians, scientific workers, and others interested in particular fields of public health work, and not to offer the publications for indiscriminate free public distribution.

Those publications marked with an asterisk (*) may be obtained only by purchase from the Superintendent of Documents, Government Printing Office, Washington, D. C., at the prices noted.

Periodicals

*Public Health Reports (weekly), July–December, vol. 57, Nos. 27 to 52, pages 987 to 2002. 5 cents a number.

*Venereal Disease Information (monthly), July–December, vol. 23, Nos. 7 to 12, pages 249 to 466. 5 cents a number.

*Journal of the National Cancer Institute (bimonthly), June–October, vol. 2, No. 6, pages 531 to 640, and vol. 3, Nos. 1 and 2, pages 1 to 226. 40 cents a number.

Reprints From the Public Health Reports

2387. An epidemic of acute respiratory infection of unusual type. By J. W. Oliphant and T. R. Dawber. July 3, 1942. 5 pages.

2388. Current needs for health personnel. By G. St. J. Perrott and Harold F. Dorn July 3, 1942. 4 pages.

2389. A study of the "skin test" with meningococcus toxins in a group of boys. By Arthur Parker Hitchens, Sara E. Branham, and Manly B. Root. Studies on bactericidal and phagocytic activity of normal human blood on meningococci in relation to the "skin test" with meningococcus toxins. By Sara E. Branham, Arthur Parker Hitchens, and Manly B. Root. July 10, 1942. 17 pages.

2390. Studies of sewage purification. XVI. Determination of dissolved oxygen in activated sludge-sewage mixtures. By C. C. Ruchhoft and O. R. Placak. July 17, 1942. 14 pages.

2391. Studies of the acute diarrheal diseases. IX A. *Shigella dysenteriae* infections among institutional inmates. By Albert V. Hardy, Rebecca L. Shapiro, Harry L. Chant, and Morris Siegel. IX B. *Shigella dysenteriae* infections among institutional inmates. By James Watt, Albert V. Hardy, and Thelma DeCapito. July 24, 1942. 24 pages.

2392. Mental hygiene services in rural areas. The program of the Mental Hygiene Division, Suffolk County Department of Health, New York. By George M. Lott. July 31, 1942. 12 pages.

2393. Transmission of rubella to *Macacus mulatta* monkeys. By Karl Habel. July 31, 1942. 14 pages.

2394. Domestic water and dental caries. V. Additional studies of the relation of fluoride domestic waters to dental caries experience in 4,425 white children, aged 12 to 14 years, of 13 cities in 4 States. By H. Trendley Dean, Francis A. Arnold, Jr., and Elias Elvove. August 7, 1942. 25 pages.

2395. Distribution of health services in the structure of State government. Chapter VI. Medical and dental care by State agencies. By Joseph W. Mountin and Evelyn Flook. August 14 and 21, 1942. 55 pages.

2396. Reconnaissance of anopheline larval habitats and characteristic desmids of the Okefenokee Swamp, Georgia. By W. C. Frohne. August 14, 1942. 9 pages.

2397. Report on market-milk supplies of Standard Milk Ordinance communities, July 1, 1940–June 30, 1942. August 14, 1942. 5 pages.

2398. Evaluating dental health programs. By John W. Knutson. August 28, 1942. 20 pages.

2399. Note on a toxic principle in eggs of the tick, *Dermacentor andersoni* Stiles. By Edward A. Steinhaus. August 28, 1942. 3 pages.

2400. A technique for staining, dissecting, and mounting the male terminalia of mosquitoes. By W. H. W. Komp. September 4, 1942. 7 pages; 1 plate.

2401. Data on the concurrence of death from tuberculosis, influenza and pneumonia, cancer, and heart diseases among husbands and wives. By Antonio Ciocco. September 4, 1942. 9 pages.

2402. Disabling morbidity among male and female industrial workers during 1941, and among males during the first quarter of 1942. By William M. Gafafer. September 4, 1942. 4 pages.

2403. Location and movement of physicians, 1923 and 1938—General observations. By Joseph W. Mountin, Elliott H. Pennell, and Virginia Nicolay. September 11, 1942. 13 pages.

2404. Studies on the duration of disabling sickness. II. Duration of disability from sickness and nonindustrial injuries among male workers, disabilities lasting one calendar day or longer. By William M. Gafafer and Elizabeth S. Frasier. September 11, 1942. 7 pages.

2405. Frequency and volume of hospital care for specific diseases in relation to all illnesses among 9,000 families, based on Nation-wide periodic canvasses, 1928–31. By Selwyn D. Collins. September 18 and 25, 1942. 51 pages.

2406. The incidence of pneumonia as recorded in the National Health Survey. By Rollo H. Britten. October 2, 1942. 16 pages.

2407. Infant mortality in rural and urban areas. By Herbert J. Sommers. October 2, 1942. 8 pages.

2408. *Ornithodoros parkeri* and relapsing fever spirochetes in southern Idaho. By Gordon E. Davis. October 2, 1942. 3 pages.

2409. Cultural characteristics of zooglea-forming bacteria isolated from activated sludge and trickling filters. By Elsie Wattie. October 9, 1942. 16 pages; 1 plate.

2410. The chemotherapeutic action of a N-phosphoryl derivative of 4-4′-diaminodiphenylsulfone. By M. I. Smith, S. M. Rosenthal, and E. L. Jackson. October 9, 1942. 9 pages.

2411. Prevention and treatment of agranulocytosis and leukopenia in rats given sulfanilylguanidine or succinyl sulfathiazole in purified diets. By S. S. Spicer, Floyd S. Daft, W. H. Sebrell, and L. L. Ashburn. October 16, 1942. 8 pages.

2412. The incidence of cancer in San Francisco and Alameda counties, California, 1938. By Herbert J. Sommers. October 16, 1942. 21 pages.

2413. The production of carious lesions in the molar teeth of hamsters (*C. auratus*). By Francis A. Arnold, Jr. October 23, 1942. 6 pages; 2 plates.

2414. An analysis of sanitary facilities in the United States. By J. M. Dalla-Valle and Rollo H. Britten. October 23, 1942. 10 pages.

2415. Variation in hospitalization with size of city, family income, and other environmental factors. Based on records for 9,000 families in 18 States visited periodically for 12 months, 1928–31. October 30, 1942. By Selwyn D. Collins. 25 pages.

2416. A summary of census data on water treatment plants in the United States. By S. R. Weibel. November 6, 1942. 16 pages.

2417. A contribution on the toxicity of algae. By R. E. Wheeler, James B. Lackey, and Stuart Schott. November 6, 1942. 7 pages.

2418. The isolation of *Haplosporangium parvum* n. sp. and *Coccidioides immitis* from wild rodents. Their relationship to coccidioidomycosis. By C. W. Emmons and L. L. Ashburn. November 13, 1942. 13 pages.

2419. Chaulmoogra oil in the treatment of leprosy. By G. W. McCoy. November 13, 1942. 6 pages.

2420. *Antricola* new genus, *Amblyomma gertschi* new species, and notes on *Ixodes spinipalpis* (Acarina: Ixodoidea). By R. A. Cooley and Glen M. Kohls. November 13, 1942 3 pages.

2421. Chloracne from cutting oils. By Louis Schwartz and Frank A. Barlow. November 20, 1942. 6 pages, 6 plates.

2422. Location and movement of physicians, 1923 and 1938—Turnover as a factor affecting State totals. By Joseph W. Mountin, Elliott H. Pennell, and Virginia Nicolay. November 20, 1942. 10 pages

2423. A disability table for urban workers. By Harold F. Dorn. November 20, 1942. 14 pages.

2424. Biological products. Establishments licensed for the propagation and sale of viruses, serums, toxins, and analogous products. November 20, 1942. 7 pages.

2425. Distribution of health services in the structure of State government. Chapter VII—Maternity-child health activities by State agencies. By Joseph W. Mountin and Evelyn Flook. November 27, 1942. 31 pages.

2426. Superficial vascularization of the cornea. The result of riboflavin therapy By Harold R. Sandstead. November 27, 1942 5 pages.

2427. The incidence of cancer in Philadelphia, Pa., 1938. By Herbert J. Sommers. December 4, 1942. 15 pages

2428. Changes in mortality rates, 1930 to 1940. By Harold F. Dorn. December 4, 1942. 11 pages.

2429. *Ixodes baergi*, a new species of tick from Arkansas (Acarina: Ixodidae). By R. A Cooley and Glen M Kohls. December 4, 1942. 4 pages; 2 plates.

2430. Lesions in rats given sulfaguanidine in purified diets. By L. L. Ashburn, Floyd S. Daft, K. M. Endicott, and W. H. Sebrell. December 11, 1942. 8 pages; 2 plates.

2431. Antibacterial action of several sulfonamide compounds on *Hemophilus influenzae* Type b. By Margaret Pittman. December 11, 1942. 11 pages.

2432. Experimental chemotherapy of burns and shock. I. Methods. II Effects of local therapy upon mortality from shock. By Sanford M. Rosenthal. December 18, 1942. 13 pages.

2433. Observations on the epidemiology of leprosy. By G. W. McCoy. December 18, 1942. 9 pages.

2434. Location and movement of physicians, 1923 and 1938—Effect of local factors upon location. By Joseph W. Mountin, Elliott H. Pennell, and Virginia Nicolay. December 18, 1942. 9 pages.

2435. *Ornithodoros* ticks as a medium for the transportation of disease agents. By R. R. Parker. December 25, 1942. 4 pages.

2436. Variations in rat infestation on vessels. By Robert Olesen and G. C. Sherrard. December 25, 1942. 5 pages.

2437. The incidence of cancer in Denver, Colorado, 1939. By Herbert J. Sommers. December 25, 1942. 16 pages.

Supplements to the Public Health Reports

167. New methods for photographing the anterior eye. By William E. Poel and Kenneth M. Hayden. 1942. 4 pages; 1 color plate; 2 halftones.

168. Mental health in later maturity. Papers presented at a conference held in Washington, D. C., May 23–24, 1941. 1942. 147 pages.

Public Health Bulletins

278. A medical study of men exposed to measured amounts of carbon monoxide in the Holland Tunnel for 13 years. By Rudolph F. Sievers, Thomas I. Edwards, and Arthur L. Murray. 1942. 74 pages.

279. The toxicity and potential dangers of toluene, with special reference to its maximal permissible concentration. By W. F. von Oettingen, P. A. Neal, D. D. Donahue, J. L. Svirbely, H D. Baernstein, A. R. Monaco, P. J. Valaer, and J. L. Mitchell. 1942. 50 pages.

National Institute of Health Bulletins

179. The anopheline mosquitoes of the Caribbean region. By W. H. W. Komp. 1942. 195 pages; 155 figures.

180. Manual for the microscopical diagnosis of malaria in man. By Aimee Wilcox. 1942. 39 pages; 13 plates.

Workers Health Series

7. Night shift. 1942. 6 pages.
8. Save your skin. 1942. 6 pages.
9. Willie's victory torch. 1942. 6 pages.

Workers Health Posters

1. Clean dry clothes keep him on the job.
2. Dental care keeps him on the job.
3. Fun off the job keeps him on the job.
4. Healthy skin keeps him on the job.
5. His mask keeps him on the job.
6. Plenty of sleep keeps him on the job.
7. Regular check-ups keep him on the job.
8. Safety first keeps him on the job.
9. Foods that count keep him on the job.

Reprints from Venereal Disease Information

178. Washington serology conference. Preliminary reports. Vol. 23, May 1942. 34 pages.

180. Modification of the horse plasma hemoglobin agar for primary culture of the gonococcus. Usefulness of Nile blue A in this medium. By Lenore R. Peizer and Gustav I. Steffen. Vol. 23, June 1942. 3 pages.

181. Delayed planting of gonococcus cultures. Preliminary reports. By Oscar F. Cox, Mary McDermott, and J. Howard Mueller. Vol. 23, June 1942. 2 pages.

182. Sulfadiazine in the treatment of gonorrhea. By Richard W. Satterthwaite, Justina H. Hill, and Virginia Huffer. Vol 23, July 1942. 6 pages.
183. Uncomplicated syphilitic aortitis—Can it be diagnosed? By R. H. Kampmeier, R. M. Glass, and F. E. Fleming. Vol. 23, July 1942. 9 pages.
184. Survival time of the gonococcus in urine from male patients with urethritis. By Samuel D. Allison, Ruth Charles, and Charles M. Carpenter. Vol. 23, August 1942. 4 pages.
185. Civilians, soldiers, and the chemical prophylaxis of venereal diseases. By Russell Frantz. Vol. 23, August 1942. 3 pages.
186. Study of delinquent syphilis patients. In the Memphis-Shelby County Venereal Disease Control Program. By Henry Packer, G. F. McGinnes, and Ruth R. Puffer. Vol. 23, August 1942. 10 pages.
187. Field study of contacts of syphilis cases. By Henry Packer, G. F. McGinnes, and Ruth R. Puffer. Vol. 23, September 1942. 8 pages.
188. Venereal disease case reporting--New York City 1941. By Theodore Rosenthal and George Kerchner. Vol. 23, September 1942. 2 pages.
189. Interstate evaluation study of serologic methods, 1942. Report of committee on evaluation of serodiagnostic tests for syphilis. Vol. 23, October 1942. 5 pages.
190. Symptomatic neurosyphilis. By Robert R. Keirland, Paul A. O'Leary, and Eleanor Vandoren. Vol 23, October 1942. 18 pages.
191. Law enforcement in venereal disease control from the standpoint of the health officer. By John H. Stokes. Vol. 23, November 1942. 10 pages.
192. Treatment with artificial fever combined with chemotherapy. By H. Worley Kendell, Donald L. Rose, and Walter M. Simpson. Vol. 23, November 1942. 14 pages.
193. Comparison of case finding methods in a syphilis control program. By Henry Packer. Vol. 23, December 1942. 10 pages.

Supplement to Venereal Disease Information

18. Acetarsone in the treatment of congenital syphilis. A review of the literature By Josephine Hinrichsen. 92 pages.

Unnumbered Publications

Index to Public Health Reports, volume 57, part 1, January–June 1942. 17 pages.
Index to Journal of the National Cancer Institute, volume 2, August 1941–June 1942. 12 pages.
Quarantine laws and regulations of the United States and international treaties applicable to international aerial navigation. 1942. 37 pages.
Folder "About Faces." (Description of a film of the U. S. Public Health Service on dental hygiene.)
The private physician today in the control of the venereal diseases By F. H. Lahey. Reprinted from Venereal Disease Information, Vol. 23, March 1942. 10 pages

THE SMALLPOX OUTBREAK IN PENNSYLVANIA

Dr. A. H. Stewart, Secretary of Health of Pennsylvania, has supplied the following interesting information regarding the recent outbreak of smallpox in that State during December 1942 and January 1943.

The first patient, the source of the epidemic, left her home in Ohio for Dover, Del., on November 4. She remained in Dover until November 10, when she came to Lancaster County, Pa. On November 15, 11 days after leaving Ohio, the smallpox prodrome appeared, but she was ill enough to be confined to bed and the house for only the two following days, November 16 and 17. On November 23 she left Lancaster County to attend a wedding in Mifflin County, and on November 27 she returned to her home in Ohio.

Secondary cases of smallpox occurred simultaneously in Lancaster and Mifflin Counties, the earliest dates of onset being December 2 and 6, giving incubation periods of 9 and 13 days, respectively. As the infection was not recognized in either Lancaster or Mifflin County until December 23 (in Mifflin County), the State health authorities found themselves confronted at once with both secondary and tertiary cases.

Reports to January 19, 1943, showed a total of 63 cases in the State, as follows: 43 cases in Mifflin County (last date of onset, January 3), 16 cases in Lancaster County (last date of onset, January 8), and 4 cases in Chester County (last date of onset, December 29, 1942). Of the 63 cases, there are breaks in the case-to-case chain in only 4 instances. There were 2 extra-State cases, 1 case in New Jersey referable to Lancaster County, and 1 case in Maryland referable to Mifflin County. The disease was of mild type; no deaths were reported.

But for the 13 unvaccinated preschool children, all of the cases in Pennsylvania occurred in individuals past middle age who, with the exception of 5, had never been vaccinated. These five developed varioloid and gave histories of vaccination in 1892, 1893, 1894, 1896, and 1906. Dr. Stewart pertinently points out that these facts bear testimony to the value of the school vaccination law in giving protection to two generations. In two populous areas of the State several persons with smallpox were at large, mingling with other persons, for 3 weeks before the presence of the infection was known and control measures could be applied.

INCIDENCE OF HOSPITALIZATION, JANUARY 1943

Through the cooperation of the Hospital Service Plan Commission of the American Hospital Association, data on hospital admissions among about 8,000,000 members of Blue Cross Hospital Service Plans are presented monthly. These plans provide prepaid hospital service. The data cover about 60 hospital service plans scattered throughout the country, mostly in large cities.

Item	January 1943	January 1942
1. Number of plans supplying data	58	56
2. Number of persons eligible for hospital care	8, 545, 423	7, 823, 616
3. Number of persons admitted for hospital care	71, 777	67, 313
4. Incidence per 1,000 persons, annual rate, during current month (daily rate × 365)	111 1	101 2
5. Incidence per 1,000 persons, annual rate for the 12 months ending January 31	107 6	106. 4

DEATHS DURING WEEK ENDED FEBRUARY 13, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Feb 13, 1943	Corresponding week, 1942
Data for 89 large cities of the United States:		
Total deaths	9, 697	8, 997
Average for 3 prior years	9, 484	
Total deaths, first 6 weeks of year	60, 654	55, 638
Deaths under 1 year of age	694	561
Average for 3 prior years	527	
Deaths under 1 year of age, first 6 weeks of year	4, 327	3, 374
Data from industrial insurance companies:		
Policies in force	65, 348, 380	64, 906, 201
Number of death claims	10, 847	9, 807
Death claims per 1,000 policies in force, annual rate	8 7	7 9
Death claims per 1,000 policies, first 6 weeks of year, annual rate	10 7	10. 0

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 20, 1943

Summary

Reports for the current week show that of the 9 common communicable diseases included in the following tables the incidence of only meningococcus meningitis is above either the respective 5-year (1938–42) median or the number of cases reported for the corresponding week last year. Decreases from the preceding week's figures are reported for all of these diseases except measles, scarlet fever, smallpox, and typhoid fever. The cumulative figures for the first 7 weeks of the year are below the corresponding medians for all except meningococcus meningitis and poliomyelitis, and are below last year's figures for the period for all except meningococcus meningitis, poliomyelitis, scarlet fever, and smallpox

There were 398 cases of meningococcus meningitis reported for the week, as compared with 403 [1] for the preceding week and with a median of 69. Decreases were shown in 5 of the 9 geographic divisions, but there were increases in the New England group of States (from 49 to 60), the East North Central (26 to 46), the West North Central (19 to 22), and the Pacific (59 to 64). Of the cumulative total of 2,456 cases reported for the first 7 weeks of the year, 21 percent occurred in the South Atlantic States, 19.5 percent in the Middle Atlantic, 15 percent in the Pacific, and 13 percent in the New England. In all sections except the East South Central group the cumulative total is higher than for the corresponding 7-week period in any of the past 6 years. In that group the figure for the current period, 146 cases, was exceeded in 1937 and 1938.

Of the total number of 15,482 cases of measles reported for the week, 6,348 occurred in the Middle Atlantic States; and of 33 cases of smallpox, 13 were in Arkansas, 9 in Indiana, and 5 in Texas.

Included among other reports for the week were the following: Dysentery, 247 cases; infectious encephalitis, 9; tularemia, 9; endemic typhus fever, 37.

Deaths in 87 major cities aggregated 10,267 for the current week, as compared with 9,732 for the preceding week. The cumulative figure for the first 7 weeks of the year is 70,639 as compared with 64,661 for the same period in 1942.

[1] Exclusive of 43 delayed reports from Virginia.

Telegraphic morbidity reports from State health officers for the week ended February 20, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria, Week ended— Feb. 20, 1943	Diphtheria, Week ended— Feb. 21, 1942	Diphtheria, Median 1938–42	Influenza, Week ended— Feb. 20, 1943	Influenza, Week ended— Feb. 21, 1942	Influenza, Median 1938–42	Measles, Week ended— Feb. 20, 1943	Measles, Week ended— Feb. 21, 1942	Measles, Median 1938–42	Meningitis, meningococcus, Week ended— Feb. 20, 1943	Meningitis, meningococcus, Week ended— Feb. 21, 1942	Meningitis, meningococcus, Median 1938–42
NEW ENG.												
Maine	0	1	1	1	4	8	6	277	122	11	0	0
New Hampshire	0	0	0	------	------	------	10	0	7	1	0	0
Vermont	0	0	0	------	------	------	275	0	7	0	0	0
Massachusetts	0	3	3	------	------	------	760	450	450	15	4	2
Rhode Island	0	1	1	------	------	------	8	94	14	28	0	0
Connecticut	0	0	0	4	1	10	320	282	108	5	1	0
MID. ATL.												
New York	15	30	26	[1] 5	[1] 17	[1] 43	1,772	635	1,048	42	6	6
New Jersey	6	8	12	23	23	30	1,078	166	166	29	5	1
Pennsylvania	9	17	33	4	------	------	3,498	1,174	1,174	21	7	5
E. NO. CEN.												
Ohio	10	7	19	11	28	28	154	190	190	6	3	3
Indiana	4	3	17	36	31	113	175	43	43	7	0	0
Illinois	9	20	23	5	19	127	506	226	226	16	0	0
Michigan [2]	4	6	6	1	2	31	205	249	424	5	0	1
Wisconsin	3	0	1	56	28	70	946	411	769	12	0	0
W. NO. CEN.												
Minnesota	2	4	4	----	1	3	32	680	366	3	0	0
Iowa	3	4	7	2	3	27	148	200	174	1	0	0
Missouri	2	2	8	------	2	59	228	[illegible]	73	[illegible]	1	1
North Dakota	1	1	1	6	22	20	28	[illegible]	15	0	0	0
South Dakota	12	0	0	------	1	3	66	5	5	0	0	0
Nebraska	0	1	5	39	3	3	258	32	32	2	0	0
Kansas	10	1	5	14	17	17	333	251	251	10	0	0
SO. ATL.												
Delaware	0	2	2	6	------	------	23	6	6	2	0	0
Maryland [2]	2	1	3	8	9	131	37	433	60	15	5	3
Dist. of Col.	1	2	3	4	1	18	80	34	10	2	1	0
Virginia	10	7	15	440	427	1,338	378	76	176	29	6	4
West Virginia	5	5	6	10	53	80	11	525	112	0	0	3
North Carolina	6	16	17	35	59	71	76	1,585	866	14	2	0
South Carolina	4	4	4	643	735	972	36	126	64	6	0	1
Georgia	2	5	7	205	145	145	52	268	268	1	1	1
Florida	1	7	5	5	4	5	23	116	58	3	2	0
E. SO. CEN.												
Kentucky	5	5	9	10	------	136	622	54	106	4	0	2
Tennessee	9	11	10	76	79	101	125	113	119	1	1	2
Alabama	7	12	10	188	453	453	17	95	148	4	0	3
Mississippi [2]	6	7	6	------	------	------	------	------	------	4	2	2
W. SO. CEN.												
Arkansas	5	5	8	145	458	458	171	365	107	0	0	1
Louisiana	6	3	6	21	5	15	126	57	11	4	1	1
Oklahoma	2	10	8	26	227	227	30	404	34	1	0	0
Texas	50	42	42	1,639	1,790	1,790	379	1,881	304	13	30	3
MOUNTAIN												
Montana	6	8	3	8	1	4	248	168	38	0	0	0
Idaho	17	1	1	------	------	------	205	38	26	3	0	0
Wyoming	0	0	0	33	209	5	43	57	20	0	0	0
Colorado	7	4	13	84	161	78	519	206	106	0	2	0
New Mexico	3	0	1	1	2	2	21	59	59	0	0	0
Arizona	0	5	5	144	166	166	21	202	20	1	0	0
Utah [2]	1	0	0	57	7	10	393	55	81	7	0	0
Nevada	0	0	------	------	------	------	14	97	------	0	0	------
PACIFIC												
Washington	3	4	2	8	3	3	1,189	54	93	11	0	1
Oregon	4	3	3	28	29	42	306	137	137	22	0	0
California	15	9	20	103	83	83	383	3,161	374	31	4	2
Total	267	287	398	4,134	5,308	6,895	16,334	15,869	15,869	398	84	69
7 weeks	2,186	[illegible]	3,028	31,258	33,080	33,080	78,682	80,610	80,610	2,456	416	386

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended February 20 1943, and comparison with corresponding week of 1942 and 5-year median—Con'

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	Feb. 20, 1943	Feb. 21, 1942		Feb. 20, 1943	Feb. 21, 1942		Feb 20, 1943	Feb 21, 1942		Feb. 20, 1943	Feb 21, 1942	
NEW ENG.												
Maine	0	0	0	0	19	19	0	0	0	1	0	0
New Hampshire	0	0	0	8	5	4	0	0	0	0	1	0
Vermont	0	0	0	13	15	12	0	0	0	0	1	0
Massachusetts	0	0	0	605	373	222	0	0	0	2	3	2
Rhode Island	0	0	0	14	14	14	0	0	0	0	0	0
Connecticut	0	0	0	71	45	92	0	0	0	0	0	0
MID. ATL.												
New York	1	5	1	507	458	648	0	0	0	2	6	4
New Jersey	0	2	1	154	146	166	0	0	0	0	0	0
Pennsylvania	0	0	0	303	447	447	0	0	0	5	8	3
E. NO. CEN.												
Ohio	0	2	0	259	370	370	1	0	0	3	4	2
Indiana	0	1	0	83	109	179	9	1	1	0	0	3
Illinois	1	1	1	272	247	510	0	0	7	2	1	3
Michigan [3]	0	1	1	105	300	300	0	4	4	3	1	2
Wisconsin	0	0	0	294	219	219	0	0	4	1	1	0
W. NO CEN.												
Minnesota	0	0	0	62	82	109	0	0	8	0	0	0
Iowa	0	0	0	97	47	75	1	0	6	0	0	0
Missouri	0	0	0	94	53	87	1	1	6	0	4	1
North Dakota	0	0	0	12	22	22	0	0	0	0	1	1
South Dakota	0	0	0	16	41	21	1	2	2	0	0	0
Nebraska	0	0	0	45	31	31	0	0	0	2	0	0
Kansas	0	0	0	89	96	96	0	1	5	1	1	1
SO ATL.												
Delaware	0	1	0	4	59	16	0	0	0	1	0	0
Maryland [3]	0	0	0	80	78	65	0	0	0	1	1	1
Dist. of Col	0	0	0	24	13	20	0	0	0	0	0	1
Virginia	0	0	0	33	25	35	0	0	0	8	2	2
West Virginia	0	0	1	28	37	53	0	0	0	0	1	2
North Carolina	1	2	2	47	68	55	0	1	0	3	0	1
South Carolina	0	0	0	4	11	11	0	0	0	0	2	1
Georgia	0	0	0	21	16	18	0	0	0	1	24	4
Florida	1	0	0	9	3	11	0	0	0	0	4	2
E. SO. CEN.												
Kentucky	1	1	2	62	81	90	0	1	1	3	0	1
Tennessee	0	1	1	80	43	47	0	4	2	0	5	3
Alabama	1	0	0	8	17	17	0	1	0	2	1	1
Mississippi [3]	1	2	0	9	12	6	1	2	2	2	3	3
W. SO. CEN.												
Arkansas	0	0	0	9	9	9	13	0	2	2	2	2
Louisiana	0	1	1	6	5	7	0	1	0	8	3	3
Oklahoma	0	0	0	12	17	30	0	0	1	1	2	2
Texas	2	0	2	83	68	68	5	22	19	4	0	7
MOUNTAIN												
Montana	0	0	0	8	37	32	1	0	0	1	0	0
Idaho	1	1	0	4	4	12	0	0	0	0	0	0
Wyoming	0	1	0	29	11	9	0	0	0	0	0	0
Colorado	0	1	0	79	58	37	0	0	7	0	0	0
New Mexico	0	0	0	4	7	10	0	0	0	1	0	0
Arizona	1	0	0	11	8	8	0	0	0	0	0	0
Utah [3]	1	0	0	77	48	33	0	0	0	0	0	0
Nevada	0	0		0	1		0	0		0	0	
PACIFIC												
Washington	1	0	0	36	57	57	0	0	0	0	0	0
Oregon	0	0	0	15	7	18	0	0	0	1	0	0
California	8	3	3	153	130	162	0	0	0	3	5	3
Total	21	26	26	4,038	4,069	4,904	33	41	55	64	87	87
7 weeks	215	180	180	26,048	25,926	30,855	216	154	508	356	580	580

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended February 20, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Whooping cough, Week ended— Feb. 20, 1943	Whooping cough, Week ended— Feb. 21, 1942	Whooping cough, Median, 1938–42	Week ended Feb. 20, 1943: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENG.												
Maine	48	48	39	0	0	0	0	0	0	0	0	0
New Hampshire	0	4	3	0	0	0	0	0	0	0	0	0
Vermont	27	34	34	0	0	0	0	0	0	0	0	0
Massachusetts	164	204	204	0	0	0	0	1	0	0	0	0
Rhode Island	5	67	37	0	0	0	0	0	0	0	0	0
Connecticut	26	82	56	0	0	3	0	0	0	0	0	0
MID. ATL.												
New York	350	504	504	0	12	31	0	1	0	0	0	0
New Jersey	203	207	200	0	1	0	0	0	0	0	0	0
Pennsylvania	273	209	361	0	0	0	0	0	0	0	0	0
E. NO. CEN.												
Ohio	180	256	202	0	1	0	1	0	0	0	0	0
Indiana	22	19	33	0	0	0	0	0	0	0	0	0
Illinois	173	131	106	0	0	0	0	0	0	0	0	0
Michigan [2]	264	234	234	0	0	2	0	0	0	0	0	0
Wisconsin	212	252	137	0	0	0	0	1	0	0	1	0
W. NO. CEN.												
Minnesota	83	38	38	0	0	1	0	0	0	0	0	0
Iowa	28	6	14	0	0	0	0	0	0	0	0	0
Missouri	2	4	28	0	0	0	0	1	0	0	0	0
North Dakota	5	15	7	0	0	0	0	0	0	0	0	0
South Dakota	5	6	6	0	0	0	0	0	0	0	0	0
Nebraska	14	4	5	0	0	0	0	0	0	0	0	0
Kansas	63	46	46	0	0	0	0	0	0	0	0	0
SO. ATL.												
Delaware	9	2	8	0	0	0	0	0	0	0	0	0
Maryland [2]	85	47	64	0	0	0	0	0	0	0	0	0
Dist. of Col.	10	32	18	0	0	0	0	0	0	0	0	0
Virginia	56	70	73	0	0	0	12	0	0	0	1	0
West Virginia	40	124	34	0	0	0	0	0	0	0	0	0
North Carolina	131	211	251	0	1	0	0	0	0	0	0	7
South Carolina	29	54	68	0	0	2	0	0	0	0	0	0
Georgia	40	18	27	0	0	2	0	0	0	0	1	6
Florida	29	19	9	0	1	0	0	0	0	0	0	2
E. SO. CEN.												
Kentucky	50	86	86	0	0	0	0	0	0	0	0	0
Tennessee	73	37	37	0	0	0	1	0	0	0	0	0
Alabama	27	5	25	0	0	0	0	0	0	0	2	6
Mississippi [2]	------	------	--	0	0	0	0	0	0	0	0	0
W. SO. CEN.												
Arkansas	35	7	8	0	0	1	0	0	0	0	2	0
Louisiana	12	3	11	0	3	1	0	0	0	0	1	2
Oklahoma	15	9	9	0	0	0	0	0	0	0	0	0
Texas	412	162	162	0	5	144	0	4	0	0	1	13
MOUNTAIN												
Montana	49	15	5	0	0	0	0	0	0	0	0	0
Idaho	5	10	9	0	0	0	0	0	0	0	0	0
Wyoming	1	5	5	0	0	0	0	0	0	0	0	0
Colorado	14	33	33	0	0	0	0	0	0	0	0	0
New Mexico	19	22	22	0	0	0	0	0	0	0	0	0
Arizona	16	81	19	0	0	0	7	0	0	0	0	0
Utah [2]	17	19	30	0	0	0	0	0	0	0	0	0
Nevada	0	13	---	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	44	92	73	0	0	0	0	0	0	0	0	0
Oregon	5	19	19	0	0	0	0	0	0	0	0	0
California	267	185	185	0	1	14	0	1	0	0	0	1
Total	3,637	3,750	3,750	0	25	201	21	9	0	0	9	37
7 weeks	27,046	29,267	29,267									

[1] New York City only.
[2] Period ended earlier than Saturday.

WEEKLY REPORTS FROM CITIES

City reports for week ended February 6, 1943

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga	0	0	33	1	7	1	5	0	7	0	6	4
Baltimore, Md	1	0	5	1	12	9	16	0	10	0	1	41
Barre, Vt	0	0	--	0	0	0	0	0	0	0	0	0
Billings, Mont	0	0	1	0	0	0	3	0	0	0	0	1
Birmingham, Ala	2	0	5	1	1	0	6	0	2	0	0	0
Boise, Idaho	0	0	-----	0	0	0	0	0	0	0	0	0
Boston, Mass	1	0	--	0	193	4	18	1	110	0	2	27
Bridgeport, Conn	0	0	1	0	9	0	1	0	11	0	0	3
Brunswick, Ga	0	0	---	0	0	0	0	0	0	0	0	0
Buffalo, N. Y	0	0	----	0	68	0	7	0	7	0	0	19
Camden, N. J	2	0		0	60	1	4	0	3	0	0	1
Charleston, S. C	1	0	32	1	0	1	0	0	1	0	0	1
Charleston, W. Va	1	0	1	0	0	0	0	0	0	0	0	0
Chicago, Ill	4	0	5	3	188	4	15	0	77	0	0	83
Cincinnati, Ohio	0	0	-----	0	23	0	8	0	37	0	0	3
Cleveland, Ohio	1	0	10	0	7	5	7	0	34	0	0	67
Columbus, Ohio	0	0	1	1	3	0	11	0	12	0	0	2
Concord, N. H	0	0	---	0	0	0	0	0	3	0	0	0
Cumberland, Md	0	0	-----	0	0	0	1	0	0	0	0	1
Dallas, Tex	1	0	---	0	0	0	3	0	2	0	0	12
Denver, Colo	8	0	30	0	175	0	10	0	10	0	0	10
Duluth, Minn	0	0	--	0	0	0	3	0	3	0	0	4
Fall River, Mass	2	0	-------	0	1	1	4	0	5	0	0	17
Fargo, N. Dak	0	0	-----	0	3	0	1	0	0	0	0	1
Flint, Mich	0	0	----	0	3	0	3	0	12	0	0	8
Fort Wayne, Ind	0	0	-	0	0	0	4	0	1	0	0	0
Frederick, Md	0	0		0	0	0	0	0	0	0	0	0
Galveston, Tex	0	0		1	5	0	0	0	1	0	0	0
Grand Rapids, Mich	0	0	----	1	2	0	1	0	1	0	0	10
Great Falls, Mont	0	0	-----	0	28	0	0	0	1	0	0	14
Hartford, Conn	1	0	----	0	14	0	2	0	1	0	0	1
Helena, Mont	0	0	-------	0	22	0	0	0	1	0	0	0
Houston, Tex	4	0	------	1	1	0	5	0	2	0	0	8
Indianapolis, Ind	1	0	------	0	51	2	13	0	22	0	0	12
Kansas City, Mo	2	0	---	3	16	0	17	0	43	0	0	0
Kenosha, Wis	0	0	----	0	1	0	0	0	2	0	0	1
Little Rock, Ark	0	0	1	0	0	0	6	0	0	0	0	2
Los Angeles, Calif	4	0	25	6	39	2	13	2	43	0	3	29
Lynchburg, Va	1	0	------	0	0	0	2	0	0	0	0	5
Memphis, Tenn	0	0	5	2	12	2	2	0	4	0	0	6
Milwaukee, Wis	0	0	1	1	192	2	7	0	87	0	0	54
Minneapolis, Minn	0	0	---	1	3	2	8	0	20	0	0	13
Missoula, Mont	0	0	----	0	0	0	0	0	0	0	0	0
Mobile, Ala	0	0	-----	1	1	0	3	0	2	0	0	0
Nashville, Tenn	0	0	----	1	91	0	4	0	5	0	0	3
Newark, N. J	0	0	-	1	7	0	10	0	12	0	0	8
New Haven, Conn	0	0	-	0	0	0	1	0	0	0	0	7
New Orleans, La	2	0	7	3	2	1	11	0	11	0	0	2
New York, N. Y	6	2	12	3	133	30	88	2	298	0	3	65
Omaha, Nebr	0	0	-	0	0	0	3	0	8	1	0	2
Philadelphia, Pa	1	0	2	0	1,406	7	38	0	88	0	1	68
Pittsburgh, Pa	1	1	3	3	0	3	18	0	16	0	0	20
Portland, Maine	0	0	-----	0	2	5	3	0	7	0	0	14
Providence, R. I	5	0	------	0	9	6	7	0	6	0	0	8
Pueblo, Colo	0	0	------	0	1	0	1	0	2	0	0	1
Racine, Wis	0	0	1	1	17	0	0	0	24	0	0	2
Raleigh, N. C	0	0	---	0	0	0	1	0	0	0	0	11
Reading, Pa	0	0	1	0	144	0	1	0	0	0	0	4
Richmond, Va	1	0	1	1	4	5	6	1	2	0	0	3

City reports for week ended February 6, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Roanoke, Va	0	0	------	0	1	0	0	0	1	0	0	0
Rochester, N. Y	0	0	------	0	11	0	6	0	5	0	0	20
Sacramento, Calif	7	0	------	0	13	1	5	0	6	0	0	5
Saint Joseph, Mo	0	0	------	0	0	0	6	0	0	0	0	0
Saint Louis, Mo	0	0	2	0	17	6	23	0	22	0	0	13
Saint Paul, Minn	0	0	----	0	2	1	6	0	4	0	0	51
Salt Lake City, Utah	0	0	----	1	73	1	6	0	23	0	0	9
San Antonio, Tex	0	0	-	0	2	0	7	1	3	0	0	0
San Francisco, Calif	0	0	6	0	18	6	10	0	16	0	0	9
Savannah, Ga	0	0	23	0	0	1	3	0	1	0	0	2
Seattle, Wash	1	0	---	1	61	4	10	0	1	0	0	7
Shreveport, La	0	0	-----	0	0	0	7	0	1	0	0	0
South Bend, Ind	0	0	------	0	6	0	0	0	0	4	0	0
Spokane, Wash	0	0	--	0	150	1	3	0	2	0	0	4
Springfield, Mass	0	0	-----	0	2	0	4	0	77	0	0	1
Superior, Wis	0	0	---	0	1	0	0	0	0	0	0	4
Syracuse, N. Y	0	0	----	0	10	3	6	0	9	0	0	30
Tacoma, Wash	0	0	----	0	59	0	0	0	1	0	0	0
Tampa, Fla	0	0	-----	0	1	0	5	0	1	0	0	0
Terre Haute, Ind	0	0	--	0	0	0	0	0	0	0	0	0
Topeka, Kans	0	0		0	13	0	1	0	3	0	0	2
Washington, D. C	2	0	2	2	30	2	18	0	21	0	0	24
Wheeling, W. Va	0	0	-	0	0	0	2	0	0	0	0	3
Wichita, Kans	0	0	---	0	14	0	5	2	2	0	0	5
Wilmington, Del	0	0	-----	0	1	0	7	0	0	0	0	4
Wilmington, N. C	0	0	-----	0	3	0	0	0	1	0	0	27
Winston-Salem, N. C	0	0	----	0	0	0	0	0	3	0	0	18
Worcester, Mass	0	0	--	0	47	0	8	0	5	0	0	3
Total	66	3	216	42	3,581	119	579	9	1,294	5	10	919
Corresponding week 1942	57		303	40	2,484		466	--	1,033	1	9	1,137
Average, 1938-42	108	-	1,430	[1] 100	[2] 3,655		[1] 605	-	1,265	22	17	1,013

Dysentery, amebic—Cases: Los Angeles, 1; New York, 2; Philadelphia, 1; St. Louis, 1.
Dysentery, bacillary—Cases: Buffalo, 3; Chicago, 2; Los Angeles, 2; New York, 9.
Dysentery, unspecified—Cases: San Antonio, 1.
Tularemia—Cases: New Orleans, 1; St. Louis, 1.
Typhus fever—Cases: Atlanta, 1; Houston, 1; New York, 1; Savannah, 2; Tampa, 1.

[1] 3-year average, 1940-42.
[2] 5-year median.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—During the week ended January 30, 1943, rats proved positive for plague were reported in Hawaii Territory as follows: Four rats in Paauhau area, 1 in Kapulena area, 1 in Honokaa area, all in Hamakua District, Island of Hawaii, T. H.

Panama Canal Zone

Notifiable diseases—December 1942.—During the month of December 1942, certain notifiable diseases were reported in the Panama Canal Zone, and terminal cities, as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	15		4		10		4		33	
Diphtheria	12	1			[1] 10		1		23	1
Dysentery (amebic)	1						2		3	
Dysentery (bacillary)	1				2	1	2	2	5	3
Leprosy			1						1	
Malaria [2]	34		9		434		332	2	800	2
Measles	2				12		1		15	
Meningitis, meningococcus					1		1		2	
Mumps	17				7		1		25	
Paratyphoid fever					4		4		8	
Pneumonia		16		1	46	3		1	[3] 46	21
Relapsing fever							1		1	
Tuberculosis		23		5	10			6	[3] 10	34
Typhoid fever			1				3		4	

[1] Includes 7 carriers
[2] Includes 182 recurrent cases
[3] Reported in the Canal Zone only

FOREIGN REPORTS

ARUBA

Diphtheria and typhoid fever.—A report dated February 5, 1943, states that up to January 30, 1943, 3 cases of diphtheria with 1 death and 5 cases of typhoid fever with 1 death were reported in the island of Aruba, West Indies.

BRITISH HONDURAS

Notifiable diseases—Year 1941.—During the year 1941, cases of certain notifiable diseases were reported in British Honduras as follows:

Disease	Cases	Disease	Cases
Cancer	108	Erysipelas	7
Cerebrospinal meningitis	4	Malaria	1,200
Chickenpox	12	Measles	29
Diabetes	20	Pneumonia	90
Diphtheria	4	Tetanus	10
Dysentery	473	Tuberculosis	113

Vital statistics—Year 1941.—Following are vital statistics for British Honduras for the year 1941:

Births per 1,000 population	34.9
Number of deaths	1,030
Deaths per 1,000 population	16.8
Infant mortality per 1,000 population	243.5

CANADA

Provinces—Communicable diseases—Week ended January 23, 1943.—During the week ended January 23, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		20		153	414	39	41	22	43	732
Diphtheria	1	20	1	25	1	4		2	1	56
Dysentery (bacillary)				5						5
Encephalitis, infectious						1				1
German measles				3	9		2	3	5	22
Influenza		25	6		15	3	17		14	80
Measles		2	2	119	83	28	68	2	38	342
Meningitis, meningococcus					1	1		1	1	4
Mumps	1	144	2	80	1,064	135	73	84	115	1,698
Poliomyelitis						2				2
Scarlet fever		8	8	156	106	10	16	20	22	346
Tuberculosis (all forms)	2	2	9	98	63	6		31	16	227
Typhoid and paratyphoid fever				11						11
Undulant fever					2					2
Whooping cough		5		101	134	40	10	26	10	326

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January-November 1942	December 1942	January 1943—week ended—				
				2	9	16	23	30
ASIA								
Ceylon	C	103						
China:								
Kunming (Yunnanfu)	C	[1] 804						
Shanghai	C	844						
India	C	140,099	4,175	471				
Calcutta	C	2,222	109	59				
Chittagong	C	55						
Madras	C	20	64	131				
Rangoon	C	1						
Vizagapatam	C	2	11	2				
India (French)	C	14						
Pondicherry	C	1						

[1] For the period May 12 to July 4, 1942

PLAGUE

[C indicates cases, P, present]

Place		January-November 1942	December 1942	January 1943—week ended—				
				2	9	16	23	30
AFRICA								
Basutoland	C	10						
Belgian Congo	C	3	1					
British East Africa								
Kenya	C	724	7	2	4	1		
Nairobi	C	67						
Uganda	C	342	4					
Egypt Port Said	C	3						
Madagascar	C	95	4					
Morocco	C	355	6		3			
Rhodesia (Northern)	C	2	13					
Senegal	C	[1] 6						
Union of South Africa	C	77	17	1				
ASIA								
China.[2]								
India	C	1,143	44	16				
Indochina (French)	C	81						
Palestine:								
Haifa	C	5						
Jaffa	C	1	[3] 6	2	2		1	
EUROPE								
Portugal Azores Islands	C	1						
NORTH AMERICA								
Canada: Alberta Province—Plague-infected fleas		P						
SOUTH AMERICA								
Argentina: Cordoba Province	C	26						
Brazil:								
Alagoas State	C	3						
Pernambuco State	C	6						
Chile: Valparaiso	C	1						
Ecuador.[4] Loja Province	C	3	1					
Peru:								
Ancash Department	C	6						
Lambayeque Department	C	3						
Libertad Department	C	7						
Salaverry—Plague-infected rats		P						
Lima Department	C	56						
Lima	C	18						
Piura Department	C	21						
OCEANIA								
Hawaii Territory: Plague-infected rats		109	13	3	1		1	6
New Caledonia	C	[5] 2						

[1] Includes 4 suspected cases.
[2] Plague has been reported in China as follows: Chekiang Province, Apr. 1–10, 1942, 4 cases; Fukien Province, Jan. 1–Apr. 5, 1942, plague appeared in 11 localities; Hunan Province, week ended Apr. 18, 1942, 2 cases; Suiyuan Province, pneumonic plague appeared in epidemic form during the period Jan. 1–Apr. 4, 1942, in the northwestern area.
[3] At Jaffa and vicinity.
[4] For the year 1942, 1 death from plague was reported in Chimborazo Province.
[5] Pneumonic.

SMALLPOX

[C indicates cases]

Place		January-November 1942	December 1942	January 1943—week ended— 2	9	16	23	30
AFRICA								
Algeria	C	814						
Angola	C	42						
Belgian Congo	C	635	79	16	8	1		
British East Africa Tanganyika	C	60	24					
Dahomey	C	56						
French Guinea	C	134						
Gold Coast	C	1,385	6	1	1			
Ivory Coast	C	71						
Morocco	C	1,548	4	2	1	7	1	2
Nigeria	C	2,269	264	67	104	123		
Niger Territory	C	986						
Portuguese East Africa	C	51						
Rhodesia								
Northern	C	9						
Southern	C	1						
Senegal	C	17						
Sierra Leone	C	1						
Sudan (French)	C	296						
Tunisia	C	1						
Union of South Africa	C	1,066						
Zanzibar	C	[1] 2						
ASIA								
Ceylon	C	7						
China	C	9						
India	C	29,792	417	214				
Indochina (French)	C	3,516	71					
Iran	C	121	14					
Iraq	C	296	11	2				
Palestine	C	4	5			1	1	
Syria and Lebanon	C	1,633	350	80	61			
Trans-Jordan	C	3						
EUROPE								
France								
Seine Department	C	44						
Unoccupied zone	C	13						
Great Britain								
England and Wales	C	5	1					
Scotland	C	80	9	1				
Ireland (Northern)	C	1						
Portugal	C	53	3		1		1	
Spain	C	211						
Turkey	C	849	992			252		
NORTH AMERICA								
Canada	C	5						1
Guatemala	C	7						
Mexico	C	112				1	2	
Panama Canal Zone	C	[2] 1						
SOUTH AMERICA								
Argentina	C	[3] 74						
Brazil	C	1	2	1				
Colombia	C	528						
Ecuador	C	4	2			1		
Peru	C	1,151	1					
Venezuela (alastrim)	C	157						

[1] Imported.
[2] In the Canal Zone.
[3] For the week ended Nov. 28.

TYPHUS FEVER

[C indicates cases]

Place		January-November 1942	December 1942	January 1943—week ended—				
				2	9	16	23	30
AFRICA								
Algeria	C	35, 205						
Basutoland	C	34						
Belgian Congo	C				1			
British East Africa Kenya	C	20	3			1		
Egypt	C	22, 975	570	396	418	446		
Gold Coast	C				1			
Ivory Coast	C	4						
Morocco	C	25, 813	14	8	6	8	22	23
Nigeria	C	5						
Niger Territory	C	1						
Rhodesia (Northern)	C	[1] 1						
Senegal	C	3						
Sierra Leone	C	7						
Tunisia	C	16, 295						
Union of South Africa	C	936						
ASIA								
China	C	369						
India	C	7						
Indochina	C	11						
Iran	C	900	2					
Iraq	C	100	5	1	4			
Palestine	C	186	20	2		10	1	
Syria and Lebanon	C	24	3		2			
Trans-Jordan	C	8						
EUROPE								
Bulgaria	C	652	10			99		
Czechoslovakia	C	17						
France:								
Seine Department	C	1						
Unoccupied zone	C	229						
Germany	C	1, 817						
Hungary	C	773	47		13	13	20	
Irish Free State	C	28	1					
Portugal	C	1						
Rumania	C	3, 629	363					
Slovakia	C	2	4		15	12		
Spain	C	3, 870					8	
Canary Islands	C	1						
Switzerland	C	3						
Turkey	C	386	41			53		
Union of Soviet Socialist Republics	C	67						
NORTH AMERICA								
Guatemala	C	229	22					
Jamaica	C	50	3			2		
Mexico	C	870	108				[2] 91	
Panama Canal Zone	C	1						
Puerto Rico	C	4						
SOUTH AMERICA								
Chile	C	107	10	2				
Colombia	C	4						
Ecuador	C	158	11	4	5	5	6	11
Peru	C	923						
Venezuela	C	20						
OCEANIA								
Australia	C	34	4					
Hawaii Territory	C	44	5	1	1			

[1] Suspected.
[2] For 3 weeks.

YELLOW FEVER

[C indicates cases, D, deaths]

Place		January-November 1942	December 1942	January 1943—week ended—				
				2	9	16	23	30
AFRICA								
Belgian Congo Libenge	D	[1] 1	1					
British East Africa Kenya	C	1						
French West Africa	C	1						
Gold Coast	C	[2] 3						
Ivory Coast	C	[2] 7						
Nigeria	C	[3] 3	[1] 1					
Senegal [4]	D	1						
Sierra Leone Freetown	C	2						
Sudan (French)	D	[1] 2						
Togo	C	2						
SOUTH AMERICA								
Bolivia:								
Chuquisaca Department	D	1						
La Paz Department	C	7						
Santa Cruz Department	C	18						
Brazil								
Acre Territory	D	4						
Bahia State	D	1						
Para State	D	1						
Colombia:								
Boyaca Department	D	5						
Cundinamarca Department	D	4						
Intendencia of Meta	D	5						
Santander Department	D	4						
Venezuela: Bolivar State	C	2						

[1] Suspected.
[2] Includes 2 suspected cases.
[3] Includes 1 suspected case
[4] According to information dated Feb 9, 1942, 15 deaths from yellow fever among Europeans have occurred in Senegal.

COURT DECISIONS ON PUBLIC HEALTH

Typhoid fever—workmen's compensation act—held to arise out of employment.—(Illinois Supreme Court; *Permanent Const. Co.* v *Industrial Commission et al.* (2 cases), 43 N.E.2d 557; decided June 11, 1942, as modified on denial of rehearing September 15, 1942.) In two cases before the Supreme Court of Illinois the question involved was whether typhoid fever, contracted by two employees of a construction company, arose out of their employment within the meaning of the State workmen's compensation act. The employees concerned worked for the construction company on the grounds of a State hospital. The only drinking water available on the grounds was from a waterworks system maintained by the State for use by those living upon and who came upon the grounds. As a result of contamination in the general water supply a typhoid epidemic occurred at the institution and about 455 persons, including inmates and others, contracted the disease. The employees in the instant cases contracted the disease from drinking the water, which was taken from the hydrants and conveyed to the employees in buckets by a water boy. The arbitrator and the State industrial commission found that these employees, by drinking the water containing typhoid bacilli furnished them by the construction company, suffered accidental injuries in the course of their employment. That finding was not contested but the question was whether the accidental injury to each employee arose out of the employment.

The supreme court said that it had in a number of cases announced the rule to be that an injury arose out of the employment when there was apparent to the rational mind, upon consideration of all the circumstances, a causal connection between the conditions under which the work was required to be performed and the resulting injury. Under this test, the injury, if it could be seen to have followed as a natural incident to the work and as a result of the exposure occasioned by the nature of the employment, arose out of the employment. The court stated its belief that the reasonable rule applicable to the cases before it was that the injury was one arising out of the employment, although unexpected and unusual, if the employees by reason of their employment were exposed to an intensified or greater risk of contracting typhoid fever than the risk to which the public in that vicinity was exposed, or if their employment necessarily accentuated the general hazard of contracting the disease, which increased hazard contributed to the injury. It could not be denied, said the court, that all who drank water on the hospital grounds were liable to contract typhoid fever and that, unless it could be said that the employees were subjected to a greater risk of contracting the disease because of their employment than was the public generally,

the disease suffered by the employees could not be said to have arisen out of their employment. On the other hand, if the company's act in furnishing to its employees water which contained typhoid bacilli could fairly be said to have increased or intensified, with respect to the employees, the risks to which the public was subjected so as to expose such employees to an extraordinary or peculiar danger to which the public generally was not equally exposed, the disease arising from drinking such water was an accidental injury arising out of the employment. By transferring the water from the mains of the hospital water system to buckets and carrying it to its employees, the company, according to the court, "must be said to have furnished the water in connection with its employees' work. * * * By furnishing drinking water to its employees plaintiff in error put itself in the same position it would have occupied had it furnished the water from its own wells. * * * When plaintiff in error elected to furnish water to its employees, it was incumbent on it to furnish water free from contamination. Under these facts the risk to its employees became a special hazard." The court's conclusion was that the employees in drinking typhoid-bacilli-contaminated water during the hours of their employment, furnished them by their employer, received accidental injuries which arose out of and in the course of the employment

Filled milk law—held valid—proof as to whether product comes within statute's prohibition.—(Florida Supreme Court; *Setzer et al.* v. *Mayo, Com'r of Agriculture*, 9 So.2d 280; decided January 27, 1942, rehearing denied April 3, 1942.) A Florida statute defined and prohibited the manufacture, possession, or sale of "filled milk." Filled milk was defined as any milk, cream, or skimmed milk to which had been added, or which had been blended or compounded with, any fat or oil other than milk fat, but did not include any milk or cream from which no part of the milk fat or butterfat had been extracted and to which had been added any substance rich in vitamins. Also excluded from the definition was any distinctive proprietary food compound not readily mistaken for milk or cream and meeting certain specified requirements. The use of chocolate as a flavor was also permitted.

In a suit, which was instituted in the trial court by the commissioner of agriculture, the Supreme Court of Florida had before it for decision the constitutional validity of the act and the remanding of the case to allow evidence to determine whether a certain product was condemned by the act. The defendants admitted that the product in question as such was condemned by the act but contended that the product did not come within the meaning of the prohibition. The appellate court was of the view that the statute was valid but stated

that, while upholding the validity of the act, it was conscious of the rule that a valid statute could be assailed by proof of facts showing that as applied to a particular article it was without support in reason because the article, although within the proscribed class, was so different from others in the same class as to be without the reason for the prohibition, the effect of the proof depending on the circumstances of the case. The court said that its opinion was planted squarely on the doctrine of two named cases and that, as it interpreted those cases, it was not sufficient to prove that cottonseed oil and other substitutes for butterfat were wholesome and nutritious. If it is shown, said the court, that in addition to being wholesome and nutritious they are rich in vitamins that are equal to or superior to those found in butterfat and will perform the same function as food elements, they should be classed in the same category and not banned by the statute. "If therefore relators can show that notwithstanding their product is produced by substituting cottonseed oil or some other substitute for butterfat and vitamins it is wholesome and nutritious and that it is equal to or superior to whole milk as a food, the test prescribed in the last two cited cases is met and their product relieved from condemnation by the Act."

Garbage removal—held to be governmental function.—(Georgia Court of Appeals, Division No. 2; *City of Brunswick* v. *Volpian*, 21 S.E.2d 442; decided July 16, 1942.) In an action for damages brought against a city for the death of a person, it was alleged that such death was caused by a city truck backing on a sidewalk without warning and that the truck was being operated at the time by an employee of the city in the collection of garbage. The Court of Appeals of Georgia held that the removal of garbage was a governmental function and that, as the truck, even though negligently backed on the sidewalk, was actually performing a governmental function at the time of the accident, it followed that the plaintiff's petition did not set out a cause of action showing the city liable for the death.

X

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease, (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 58 MARCH 5, 1943 NUMBER

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol. 58 • MARCH 5, 1943 • *No. 10*

COLIFORM CONFIRMATION FROM RAW AND CHLORINATED WATERS WITH BRILLIANT GREEN BILE LACTOSE BROTH

By Elsie Wattie, *Associate Bacteriologist, United States Public Health Service, Stream Pollution Investigations, Cincinnati, Ohio*

The use of various selective media for determining the presence of the coliform group in water has been studied by a large number of workers. In this brief communication no effort will be made to review this voluminous literature, which has been summarized by McCrady (*1*), who conducted an extensive study to compare the efficiency of various selective media with the Standard Methods Completed test. From this review and the results of his study he concluded: (1) that brilliant green bile lactose broth (B. G. B.) was the most satisfactory of the selective media tried; (2) that confirmation in B. G. B. usually yields more accurate results than those obtained by the Standard Methods Completed test; and (3) that fewer false positives were obtained with B. G. B. than with the other selective media. In addition, the time required for obtaining the coliform index was greatly shortened. Raw and treated inland waters were the source of McCrady's samples. Later Kelly (*2*) studied the use of the B. G. B. confirmatory procedure with samples of sea water and shellfish. His results are in agreement with those of McCrady, but the superiority of the B. G. B. confirmation was not so well marked in the case of shellfish. Since then Smith (*3*), and Howard, Lockhead, and McCrady (*4*) have reported a high degree of correlation in the use of B. G. B. as a confirmatory media.

Frequently the coliform index as determined by the use of B. G. B. was higher than that obtained by the Standard Methods procedure. The increased index thus obtained is on the side of safety, as far as water quality is concerned, and it also tends to compensate for the failure of the Standard Methods Completed test to demonstrate all coliforms present. This failure of the Standard Methods Completed test to detect all coliforms was clearly demonstrated by McCrady's results. He calculated that it failed to detect approximately 14 percent.

Practically all previous studies of this nature have based B. G. B. confirmation on gas production in B. G. B. after 48 hours' incubation at 37° C., with the amount of gas required for a positive result varying

from "10 percent or more" to "gas in any amount." The feeling exists on the part of some observers that by limiting the incubation period to 24 hours at 37° C. and accepting gas in any amount as the criterion for a positive, the results obtained would be comparable with those of the Completed test and 24 hours would be saved. Definite information on this point, particularly with chlorinated waters, appears to be lacking. The principal object of the present study was to obtain definite information concerning the point in question.

During the past year, in studies of polluted surface waters and waters treated by chlorination alone, coliform determinations were made on 945 samples; of these 228 were of raw water, and 717 were representative of the same water after treatment by chlorination to varying degrees. Gas-producing lactose broth tubes were confirmed by transfer to B. G. B. lactose broth and also by carrying through the Standard Methods Completed test. In making the Completed test the procedures given in Standard Methods were adhered to strictly. Gas-producing B. G. B. confirmatory tubes were also carried through the Completed test to determine whether the gas-producing B. G. B. tube contained a member of the coliform group.

With gas production in any amount after 48 hours' incubation as the criterion for a B. G. B. confirmed result, the "most probable numbers" (M. P. N.) of coliform organisms thus obtained from the 228 raw water samples were identical with those of the Completed tests in 79.8 percent of the samples, but higher in 15.4 percent and the Completed tests were higher in 4.8 percent. For this group of samples, if the B. G. B. results considered were limited to those showing gas in any amount during the first 24 hours of incubation only, the positive results would be reduced by 25 percent.

Consideration is now given to the results obtained from the examination of the 717 chlorinated samples. These samples were composed of 239 after primary chlorination, 239 after primary and secondary chlorination, and 239 samples of water from the distribution system which had been exposed to the effects of chlorine for varying lengths of time. The M. P. N.'s obtained by B. G. B. confirmation, using any amount of gas formation during 48 hours of incubation as the criterion for a positive result, were identical with those of the Completed test in 97.1, 95.4, and 96.7 percent, respectively, from the sources of samples as given. The B. G. B. results were higher in 2.5, 2.9, and 2.5 percent, and lower in 0.4, 1.7, and 0.8 percent, respectively. Considering the results from chlorinated samples from all sources as a unit and limiting positive B. G. B. confirmations to those obtained after 24 hours only, the positive results are reduced by 5.8 percent. These results are shown in table 1 and illustrated in figure 1.

TABLE 1.—*Coliform determinations from raw and chlorinated water by (a) Standard Methods Completed test, and (b) brilliant green bile confirmation*

Sample	Completed test higher	B. G. B. 48 hours higher	Results identical	B. G. B.	
				Higher at 48 hours	Same at 24 and 48 hours
(1)	(2)	(3)	(4)	(5)	(6)
	M. P. N. per 100 ml. from raw waters				
Number	11	35	182	52	176
Percent	4 8	15 4	79 8	22 8	77 2
	M. P. N per 100 ml. from primary chlorinated waters				
Number	1	6	232	11	228
Percent	.4	2 5	97 1	4 6	95 4
	M. P. N per 100 ml. from secondary chlorinated waters				
Number	4	7	228	11	228
Percent	1 7	2 9	95 4	4 6	95 4
	M. P. N. per 100 ml from distribution system waters				
Number	2	6	231	15	224
Percent	.8	2 5	96 7	6 3	93 7

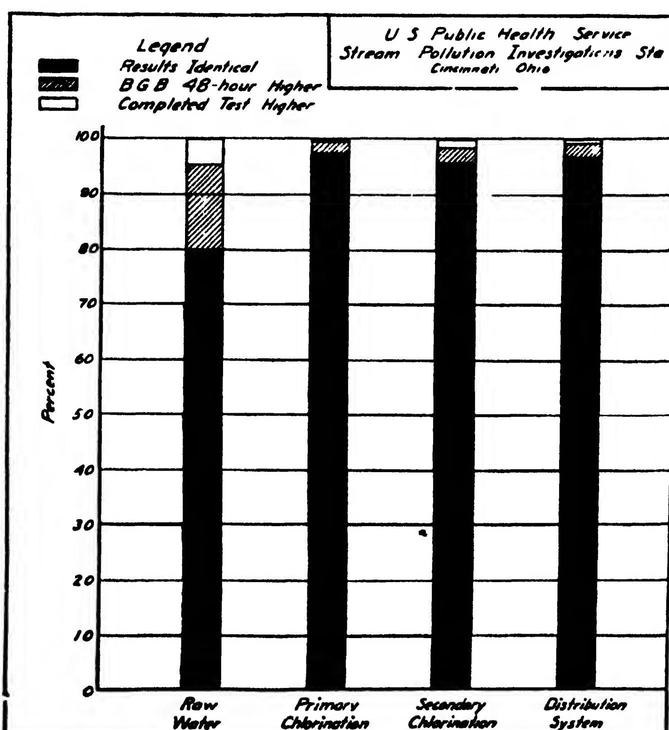


FIGURE 1.—Comparison of coliform confirmations by Standard Completed and B. G. B. 48-hour tests. M. P. N. results.

In studying the basic data from which the results of table 1 were obtained, it was noted that, particularly in the case of the results from chlorinated waters, the majority of the items reported under column 4, "Identical results" and column 6, "M. P. N.—Same at 24 and 48 hours," were made up from samples which had a zero (no positives from five 10-ml. portions) coliform index by both methods. Although this is the usual method of presenting such data, the inclusion of such a large number of negatives in the averages very greatly affects the percentages obtained and markedly obscures the real difference between the results of B. G. B. confirmation obtained after 24 and 48 hours of incubation, respectively.

Accordingly, to clarify this point the data of table 1 have been retabulated in table 2 with the B. G. B. confirmed results broken down into: (1) those with identical M. P. N.'s at both 24 and 48 hours of incubation composed of (a) those identical with a zero index and (b) those identical with a positive index; and (2) those with a higher index after 48 hours of incubation. This arrangement provides for a direct comparison between positive B. G. B. confirmations at 48 and at 24 hours of incubation.

It is noted from this table that, limiting the samples considered to those with positive results at either 24 or 48 hours, a very marked increase in positives, varying from 24.9 to 75 percent, is obtained by holding the B. G. B. confirmatory tubes for the additional 24-hour period. (It should be noted here that all of these 48-hour B. G. B. gas-forming cultures, except one, were subjected to the Standard Methods Completed test as will be described presently.)

Although it may be merely a coincidence, it is interesting to note that the percentage of B. G. B. positives, obtained between the

TABLE 2.—*Coliform confirmations in B. G. B. after 24 hours and 48 hours of incubation at 37° C.*

Sampling source	Samples	Samples giving M. P. N.: Same at 24 and 48 hours: Including all samples	Negative samples	Positive samples	Higher at 48 hours	Total number of samples
Raw water	Number	176	19	157	52	228
	Percent	77.2	8.3	68.9 [1] 75.1	22.8 [1] 24.9	------ ------
Primary	Number	228	215	13	11	239
	Percent	95.4	90.0	5.4 [1] 54.2	4.6 [1] 45.8	------ ------
Secondary chlorination	Number	228	222	6	11	239
	Percent	95.4	92.9	2.5 [1] 35.3	4.6 [1] 64.7	------ ------
Distribution system	Number	224	219	5	15	239
	Percent	93.7	91.6	2.1 [1] 25.0	6.3 [1] 75.0	------ ------

[1] Percent calculated on basis of positive samples only.

twenty-fourth and forty-eighth hour of incubation, increases with the chlorine dosage and with the time of exposure to chlorine. Thus, in table 2, for raw lake water the percentage was 24.9, for primary chlorinated waters 45.8, for water subjected to both primary and secondary chlorination 64.7, and for waters from the distribution system 75.0. These results are presented graphically in figure 2.

A similar comparison has been made of B. G. B., confirmed results with completed results on the basis of each lactose broth tube showing

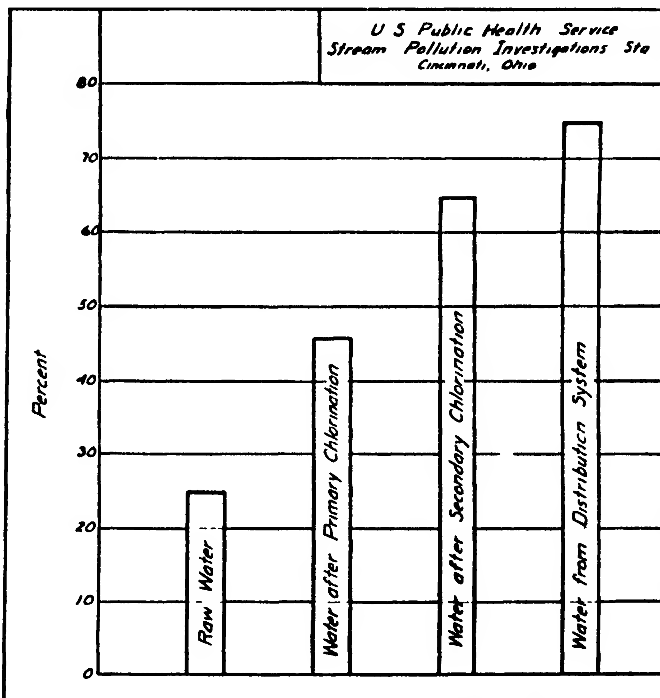


FIGURE 2.—Percent of positive samples showing higher M P. N after 48-hour incubation (B G B-confirmation.)

gas production. From the raw-water series, 726 gas-producing lactose broth tubes were tested by both procedures. Of these tubes, 675 were completed by Standard Methods and 51 failed. From this group, in the B. G. B. medium, 89.0 percent confirmed in 24 hours, 98.6 percent confirmed by producing gas during the 48-hour period and 1.4 percent produced no gas. All of the 51 tubes which failed to complete by Standard Methods confirmed in B. G. B., 32 after 24 hours and 19 only after 48 hours. Of these 51 B. G. B. tubes, 39 were carried through the completed test; 15 of these completed and 24 failed to complete. From the raw water samples there were 144 tubes which produced gas in the primary lactose broth tube but failed to confirm either by the Standard Methods Completed test or with B. G. B.

From the 239 primary chlorinated samples 29 gas-producing lactose broth tubes were tested by both procedures. Of these 20 were positive by the Completed test and 9 failed. These 9 tubes which produced gas, a bubble or more, in B. G. B. were carried through the Completed test; 2 confirmed and 7 failed to confirm. Similarly, 20 gas-producing tubes were obtained from 239 secondary chlorinated water samples. Of these 11 completed and 9 failed. All of these 9 cultures produced gas in B. G. B. in 48 hours and were subjected to the Completed test;

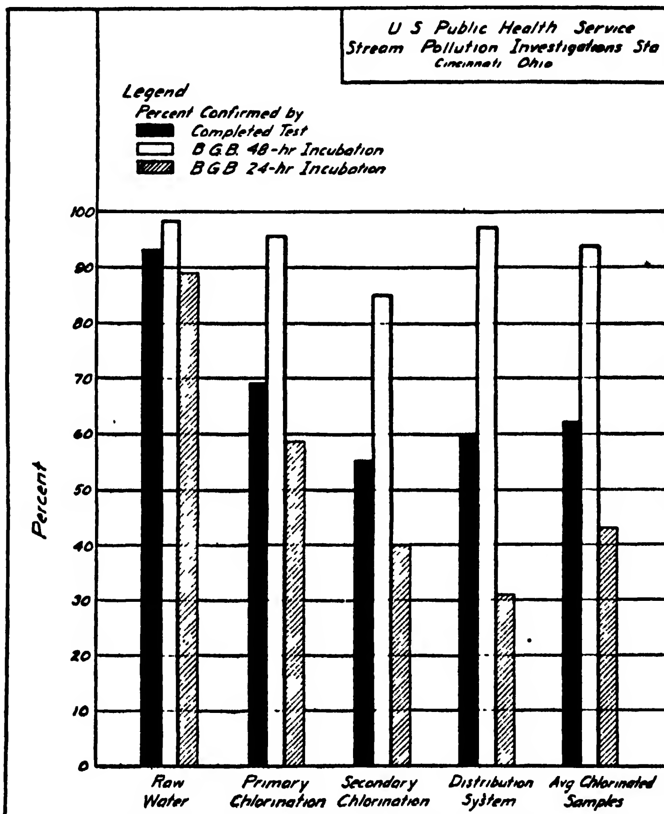


FIGURE 3.—Coliform confirmations Gas-producing tubes confirmed.

3 completed and 6 failed. From the distribution system samples, 35 gas-producing tubes were obtained. Of these, 21 completed by Standard Methods and 14 failed. All of these 14 cultures produced gas in B. G. B. and all but one of the 14 B. G. B. tubes were carried through the Completed test; 3 completed and 10 failed.

From all of the chlorinated and finished water samples, there was a total of 243 primary lactose broth tubes which failed to confirm by either method. Frequently gas production in these tubes was due to a mixed culture, or the presence of spore bearers.

Considering all of the treated water samples as a unit, 52 out of the 84 gas-producing tubes completed by the Standard Method, 79 confirmed by producing gas in B. G. B. during 48 hours, and 36 confirmed by producing gas in B. G. B. in 24 hours. Complete data for all samples considered in this manner on a tube basis are presented in table 3 and figure 3.

TABLE 3.—*Coliform confirmations*[1] *obtained by (1) Standard Methods Completed test and (2) B. G. B. after 24 and 48 hours' incubation*

Sampling source	Number of gas-producing tubes	Number tubes positive by—			Percent of tubes positive by—		
		Completed test	B. G. B. 48 hours	B. G. B. 24 hours	Completed test	B. G. B. 48 hours	B. G. B. 24 hours
Raw water	726	675	716	646	93 0	98 6	89 0
Primary chlorination	29	20	28	17	69 0	96 6	58 6
Secondary chlorination	20	11	17	8	55 0	85 0	40 0
Distribution system	35	21	34	11	60 0	97 1	31 4
Total chlorinated	84	52	79	36	61 9	94 0	42 8

[1] Calculations based on number of tubes producing gas (in any amount) in the primary lactose broth tube during 48 hours' incubation at 37° C

SUMMARY

A comparison of coliform determinations in raw and chlorinated water by (1) B. G. B. confirmation and (2) Standard Methods Completed test has been made. In general, the results obtained with B. G. B. are slightly higher than those of the Completed test when any amount of gas in B. G. B. after 48 hours' incubation at 37° C. is accepted as the criterion of a positive result.

The relative number of positive B. G. B. confirmations obtained after 24 and 48 hours of incubation appears to vary with the nature of the water; the more extensively the water has been treated or the longer it has been exposed to the effects of chlorine, the greater the number of B. G. B. confirmations obtained between the twenty-fourth and forty-eighth hour of incubation.

REFERENCES

(1) McCrady, M. H.: A practical study of procedures for the detection of the presence of coliform organisms in water. Am. J. Pub. Health, **27:** 1243 (December 1937).

(2) Kelly, C. R.: Brilliant green lactose bile and the Standard Methods Completed test in isolation of coliform organisms. Am. J Pub. Health, **30:** 1034 (September 1940).

(3) Smith, Fred E.: Comparative studies of lactose broth and brilliant green bile at Cambridge, Mass. J. New Eng. Water Works Assn., **54:** 16 (March 1940). Abstract, J. Am. Water Works Assn., **33:** 191 (January 1941).

(4) Howard, N. J., Lockhead, A. G., and McCrady, M. H.: A study of methods for the detection of the presence of coliform organisms in water. Canad. Pub. Health J., **32:** 29 (January 1941). Abstract, J. Am. Water Works Assn., **33:** 997 (May 1941).

PARENTAL AND FAMILIAL FACTORS IN THE ACCEPTANCE OF DIPHTHERIA AND SMALLPOX IMMUNIZATION [1]

By LESTER BRESLOW, *District Health Officer, Minnesota Department of Health,* PEARL R. SHALIT, *Director of Education, St Paul Family Nursing Service,* and GAYLORD W. ANDERSON, *Professor and Head of Department of Preventive Medicine and Public Health, University of Minnesota,* now *Major, Medical Corps, Army of United States*

Students of health education have commonly suggested that specific services offered by public health agencies have an educational effect and that, therefore, the ultimate value of these services should be measured not solely in the direct health protection so conferred but also in terms of what is learned by the recipient of these services. Thus it has been maintained that the child who is immunized against diphtheria learns the value of this prophylaxis and will, therefore, in later life as a parent be more ready to provide a similar protection for his children. Unfortunately no factual evidence is available to support or deny this contention. The study here reported is an exploratory attempt to determine whether or not the individual who has been immunized against diphtheria or smallpox is more likely to provide for the immunization of his children than is one who was not so protected and whether or not the parent who has learned to provide for one child will similarly safeguard other members of the family.

Nurses on the staff of the St. Paul Family Nursing Service obtained histories from the mothers who were bringing children to attend the agency's Child Health Supervision Clinics. A uniform blank was used throughout the study, this blank including, among other items, questions regarding the immunization status of father, mother, and all the children in the family, nature of reaction experienced by the mother at the time of immunization, and the reason for failure to provide immunization for those children who had not been protected. Obviously the information as to parental immunization, and especially of attendant reaction, is often inaccurate but the mental attitude of the parent toward immunization is conditioned by what the person recalls, whether memory is correct or incorrect. Thus the replies on these points, though often unreliable, do reflect what these persons believed to be correct and represent a true picture of whether or not the person has or has not learned the value of such prophylaxis from what he believes to have been his experience with it.

The group for study was selected from the city of St. Paul as this city has for a number of years been conducting its diphtheria immunization and smallpox vaccination through a combination of clinics in the schools for the school children and regular periods in the

[1] From the Department of Preventive Medicine and Public Health, University of Minnesota, and the St. Paul Family Nursing Service.

Board of Health Office, supplemented during the past 4 years by annual clinics, in cooperation with Family Nursing Service, at their district stations. As no immunization was given in the regular clinics of the Family Nursing Service, all protection of the children here studied required attendance at one of the other clinics or the services of the family physician. As the group served was in general financially unable to afford the latter, any immunization of a preschool child would represent an effort on the part of the mother, who would have had to make special trips to take her child to the Board of Health clinics. It would therefore represent an active desire on the part of the parent (usually the mother) to obtain this protection for her child, not merely placid acceptance of a procedure which was virtually thrust upon her, as in some clinics.

The present study included 1,534 families with 3,684 children. Inasmuch as vaccinations and immunizations were not recommended for children under 6 months of age, most of the tabulations concern only the children above that age, of whom there were 3,372.

Vaccination and immunization [2] *status of the group as a whole.*—Of all the children over 6 months of age 66.1 percent had been vaccinated and 63.9 percent immunized against diphtheria (table 1). These rather high rates are, of course, reflections of the nature of the special group being studied.

TABLE 1.—*Vaccination and immunization status of children surveyed*

	Number	Percent		Number	Percent
Vaccinated	2, 219	66 1	Immunized	2, 137	63 9
Not vaccinated	1, 140	33 9	Not immunized	1, 206	36 1
Total	[1] 3 359	100 0	Total	3 343	100 0

[1] The figures in this and subsequent tables often do not equal the total of 3,372 children in the study, due to occasional defective records, omission of an item from the completed history, or uncertainty on the part of the parent as to the exact status of certain children.

In general, both vaccination and immunization had been performed if either had been done. Of the children who had been vaccinated 92.3 percent were also immunized and an even higher proportion, 95.3 percent, of those immunized had been vaccinated (table 2). The policy of the Health Department of giving the first inoculation against diphtheria at the same time as the vaccination may have been a factor in this high rate of protection against both diseases if immunization had been given against either. The figures suggest, however, that acceptance of the principle of immunization has carried with it a desire to avail oneself of whatever protection was offered.

Age.—The vaccination and immunization status for the entire group of children according to age level as of the time of the study

[2] For the sake of brevity, the term "vaccination" is used throughout the remainder of this article to imply vaccination against smallpox and the term "immunization" to imply immunization against diphtheria unless the context clearly implies otherwise.

is shown in table 3. The tendency for a slightly higher proportion to be vaccinated than to be immunized holds fairly consistently at all ages, except 6 years. Here the factor reversing the ratio may be the influence of the school clinics.

Table 4 indicates the ages at which vaccinations and immunizations were performed for all children who had been protected. It will be noted that practically one-half had been done before the end of the third year of life. Approximately one-fifth of the vaccinations and

TABLE 2.—*Relation between vaccination and immunization status of children surveyed*

	Number	Percent	Number	Percent
	Vaccinated		Not vaccinated	
Immunized	2,031	92.3	101	8.9
Not immunized	170	7.7	1,036	91.1
Total	2,201	100.0	1,137	100.0
	Immunized		Not immunized	
Vaccinated	2,031	95.3	170	14.1
Not vaccinated	101	4.7	1,036	85.9
Total	2,132	100.0	1,206	100.0

TABLE 3.—*Vaccination and immunization status by age of children at time of survey*

Age of child (years)	Number of children in each group	Percent vaccinated and immunized	Percent vaccinated but not immunized	Percent immunized but not vaccinated	Percent not immunized or vaccinated	Total percent
½ to 1	262	14.9	0.4	1.1	83.6	100.0
1	575	37.4	1.9	1.7	59.0	100.0
2	386	47.2	4.9	2.1	45.9	100.1
3	345	55.9	8.1	3.5	32.5	100.0
4	276	62.0	8.3	4.3	25.4	100.0
5	222	60.8	13.5	5.4	20.3	100.0
6	187	77.5	5.3	10.2	7.0	100.0
7	125	87.2	4.8	3.2	4.8	100.0
8	135	88.1	2.2	3.7	5.9	99.9
9	105	94.3	2.9	1.9	1.0	100.1
10 and over	624	90.4	5.0	2.1	2.4	99.9
Total	3,242					

TABLE 4.—*Age at which vaccinations and immunizations were performed*

Age (years)	Vaccinated		Immunized	
	Number	Percent	Number	Percent
Under 2	1,012	47.3	933	45.7
3-4	315	14.7	289	14.1
5-6	448	21.0	502	24.6
7-8	139	6.5	137	6.7
9 and over	225	10.5	182	8.9
Unknown	(80)		(94)	
Total (less unknown)	2,139	100.0	2,043	100.0

one-fourth of the immunizations were performed at about the age of entrance to school—5 and 6 years.

It is of interest to compare the extent of vaccinations and immunizations in early life among the entire group of children with that among the youngest children, as an indication of progress toward protection of the infant and young child. Examination of table 4 reveals that 47.3 percent of the vaccinations of all the children who had been protected against smallpox were performed before the age of 3 years; on the other hand 52.1 percent (table 3) of all those who were 2 years old at the time of the present study had already been vaccinated. A similar phenomenon holds for diphtheria immunizations. In comparing these proportions, 47.3 percent and 52.1 percent, one should keep in mind the fact that the former figure is based only upon those who eventually were vaccinated (i.e., 66.1 percent of the total), whereas the 52.1 percent applies to all the 2-year-olds of the study.

The experience of this group of families indicates that for children of all ages, including those who attended the clinic and those who did not (though a younger sibling was registered at the clinic), less than one-third (47.3 percent×66.1 percent) had had either vaccination or immunization before the end of the third year of life; whereas of children now 2 years old (practically all of whom attended the clinic) over one-half have already had both protections. This increase possibly reflects the greater emphasis in recent years on protection of the infant and very young child, particularly the direct influence of the clinic and the recent provision of special facilities for this by the Health Department.

Sex.—A slightly higher proportion of females than of males was vaccinated and immunized (table 5). In the case of vaccination the difference was only of such a magnitude as might have arisen 17 times out of 100 solely due to errors of random sampling; in the case of immunization the difference is more probably significant. It is of interest that a similar higher frequency among females, for ages below 25 years, was noted in Collins' (*1*, *2*) analysis of the United States Public Health Service survey.

TABLE 5.—*Relation between sex of child and vaccination and immunization status*

Sex	Number	Percent	Number	Percent	Total number
	Vaccinated		Not vaccinated		
Males	1,102	65.3	586	34.7	1,688
Females ($p\chi^2$=0.167)	1,114	67.6	534	32.4	1,648
	Immunized		Not immunized		
Males	1,048	62.3	633	37.7	1,681
Females ($p\chi^2$=0.021)	1,085	66.2	554	33.8	1,639

Socio-economic status.—The present study included only a relatively homogeneous socio-economic group, determined by eligibility for the clinics. An attempt to break it down on the basis of a crowding index (ratio of number of persons in a household to the number of rooms) revealed no significant variation according to the index used. In the survey of 9,000 families reported by Collins (*1*, *2*), it was found that families with incomes of less than $1,200 or more than $5,000 per year had about the same vaccination rates but both were nearly twice the rates for the three intervening classes. No meaningful comparison between Collins' study and the present one is possible because of the limited income range of this group.

Effect of parental vaccination and immunization status.—Children whose mothers had been vaccinated were vaccinated to a slightly (though significantly) greater extent than were children whose mothers had not been vaccinated, the proportions being 67.2 percent and 59.5 percent, respectively (table 6). Similar rates prevail according to vaccination status of the father. On the other hand, the diphtheria immunization status of neither the father nor the mother had any apparent relation to the likelihood that the children would be immunized.

In interpreting the differences, which are statistically significant in the case of vaccinations, it should be recalled that many of these parental vaccinations were performed during the epidemic of malignant smallpox in Minnesota in 1924 to 1925. The differences may

TABLE 6.—*Relation between vaccination and immunization status of parents and that of their children*

Status of parent	Status of children over 6 months of age				Total number
	Number	Percent	Number	Percent	
	Vaccinated		Not vaccinated		
Mother.					
Vaccinated	1,894	67.2	923	32.8	2,817
Not vaccinated	311	59.5	212	40.5	523
($p\chi^2$=0.001)					
	Immunized		Not immunized		
Immunized	665	63.8	378	36.2	1,043
Not immunized	1,366	64.2	761	35.8	2,127
($p\chi^2$=0.813)					
	Vaccinated		Not vaccinated		
Father:					
Vaccinated	1,549	68.1	726	31.9	2,275
Not vaccinated	223	61.4	140	38.6	363
($p\chi^2$=0.012)					
	Immunized		Not immunized		
Immunized	500	66.1	257	33.9	757
Not immunized	582	65.1	312	34.9	894
($p\chi^2$=0.678)					

reflect the subsequent influence of fear of smallpox occasioned by this epidemic rather than any true educational effect of the vaccinations themselves.

In the case of diphtheria, there has been no such additional motivating force and there is no difference in the extent of immunization of children of immunized as contrasted with nonimmunized parents. Even the difference in the case of smallpox vaccination, though significant, is disappointingly small. Perhaps the most significant fact is that approximately a third of the children of the immunized or vaccinated parents had not as yet been protected.

It seems apparent from these data that, so far as concerned the group under study, the immunization or vaccination of the parental generation earlier in life does not appreciably increase the subsequent readiness of these parents to accept or seek similar procedures for their children. The fact that, except for a slight difference in the case of smallpox vaccination, the unprotected parents provided for the vaccination and immunization of their children as well as did those who had been protected themselves, would suggest that the latter group had not undergone an educational as well as an antigenic experience at the time of its immunizing experience in childhood.

Effect of severity of mothers' reactions.—The mothers were asked to classify the reactions which they had experienced at the time of vaccination and immunization as none, mild, moderate, or severe. The severity of these reactions (table 7) had no measurable effect on whether or not the children were later protected. The rates for diphtheria immunizations showed a slight trend toward fewer inoculations among those children whose mothers had experienced what they considered to have been severe reactions, but this trend was not statistically significant.

TABLE 7.—*Relation between mother's reaction to vaccination and immunization and children's vaccination and immunization status*

	Status of children over 6 months of age				
	Number	Percent	Number	Percent	Total number
	Vaccinated		Not vaccinated		
Mother's reaction to vaccination:					
None or mild	799	65.5	420	34.5	1,219
Moderate	495	68.1	232	31.9	727
Severe	457	68.5	210	31.5	667
(px^2 = 0.327)					
	Immunized		Not immunized		
Mother's reaction to immunization:					
None or mild	355	64.2	198	35.8	553
Moderate	124	61.7	77	38.3	201
Severe	37	59.7	25	40.3	62
(px^2 = 0.607)					

Effect of vaccination and immunization of older siblings.—Does vaccinating and immunizing an older sibling increase the probability that younger siblings will receive protection? It will be seen from table 8 that in two-child families where the younger sibling was over 6 months of age, if the older child was vaccinated, 54 percent of the younger siblings were also vaccinated; whereas if the older child was not vaccinated only 1.2 percent of the younger siblings were protected. Almost exactly parallel rates were found for diphtheria immunizations (as might be expected from the practice of giving the first diphtheria inoculation and the smallpox vaccination at the same time). Thus it appears that in the clinic group if the older child is protected there is a much greater probability that the younger child will be similarly vaccinated and immunized, than if the older child is not protected.

Palmer and Derryberry (*3*) studied the data collected in 156 cities during the White House Conference Survey. They found for ages up to 3 years in two-child families a higher proportion of younger siblings immunized if their older siblings had been vaccinated than younger siblings vaccinated if the older siblings were immunized. From this, as well as from other considerations, they conclude that health agencies are stressing diphtheria immunization more than smallpox vaccination for very young children.

This conclusion does not apply to the St. Paul group of the present study. Table 8 reveals that if the older sibling was vaccinated,

TABLE 8.—*Relation between vaccination and immunization of older child to that of younger child in two-child families (all younger children over 6 months of age)*

Status of older child	Status of younger child				
	Number	Percent	Number	Percent	Total number
	Vaccinated		Not vaccinated		
Vaccinated	141	54.0	120	46.0	261
Not vaccinated	1	1.2	83	98.8	84
	Immunized		Not immunized		
Vaccinated	137	52.9	122	47.1	259
Not vaccinated	3	3.6	81	96.4	84
	Immunized		Not immunized		
Immunized	139	55.2	113	44.8	252
Not immunized	1	1.1	90	98.9	91
	Vaccinated		Not vaccinated		
Immunized	138	54.5	115	45.5	253
Not immunized	3	3.3	88	96.7	91

52.9 percent of the younger siblings were immunized; whereas if the older sibling was immunized, 54.5 percent of the younger siblings were vaccinated. The numbers of children involved were too small for significant analyses for each separate year of age so as to make the data comparable to that of Palmer and Derryberry. But all of the younger children in the present study must have been of preschool age in order to be registered at the clinics. Also table 3 indicates that a slightly higher proportion, at each age from 1 to 5 years, was vaccinated than was immunized.

Effect of mothers' schooling.—One might logically expect that the farther a parent had progressed in school the greater would be the probability that the children would be vaccinated and immunized. It is somewhat surprising therefore to find that (table 9), of the children whose mothers had attended only grade school, 71 percent had been vaccinated whereas only 61.7 percent of those whose mothers had attended high school had been vaccinated. If the mothers had attended college the rates rose again to 66.3 percent. Similar rates were found for immunization. The chance that such differences might arise solely due to errors of random sampling is less than 1 per 1,000.

One possible explanation for fewer vaccinations and immunizations among children whose mothers had attended high school is the fact that such mothers tended to have smaller families (1.9 children) than did mothers who had attended only grade school (2.7 children). It might be surmised that since the grade school mothers had relatively more children, some of these would be older and thus obtain a greater probability of being vaccinated and immunized on entrance to school. Analysis of preschool children by individual years of ages did not, however, substantiate this hypothesis. The same trend, higher frequency of vaccinations and immunizations among children of grade school mothers than among children of high school mothers, appeared in the 2-, 3- and 4-year-old children. For lack of a more satisfactory expla-

TABLE 9.—*Relation between mother's schooling and vaccination and immunization status of children*

Extent of mother's education	Number of children per family	Status of children over 6 months of age									
		Vaccinated		Not vaccinated		Total number	Immunized		Not immunized		Total number
		Number	Percent	Number	Percent		Number	Percent	Number	Percent	
Grade school	2.7	1,022	71.0	418	29.0	1,440	1,002	69.9	432	30.1	1,434
High school	1.9	944	61.7	587	38.3	1,531	892	58.6	630	41.4	1,522
College	1.9	118	66.3	60	33.7	178	120	67.8	57	32.2	177
			(px^2=<0.001)					(px^2=0.001)			

nation, one is tempted to wonder as to the applicability of the old adage that "A little knowledge is a dangerous thing." May high school education actually increase one's resistance to vaccination and immunization?

Reasons for failure to vaccinate and immunize.—If the mother had any children who had not been vaccinated and immunized, she was asked to state the reason for the failure. A rough classification of these reasons is presented in table 10. Shepard (*4*) previously studied the immunization status of 6,245 urban children in the western part of the United States. The reasons which he found for failure to immunize are also tabulated in table 10 for comparison.

TABLE 10.—*Reasons given by mothers for failure to have children over 6 months of age vaccinated and immunized*

Reasons	Present study				Shepard's study (4)		
	Mothers whose children were not vaccinated		Mothers whose children were not immunized				
	Number	Percent	Number	Percent	Number	Percent	Reasons
Procrastination	327	41.4	327	40.6			
Neglect	177	22.4	186	23.1	979	50.0	Lethargy.
Inconvenience	18	2.3	18	2.2			
Ignorance of procedure	3	.4	4	.5			
Child too young	76	9.6	75	9.3	406	20.7	Ignorance.
Prejudice	49	6.2	52	6.5	424	21.7	Opposition
Ignorance of free facilities	12	1.5	12	1.5	131	6.7	Economic
"Medical"	57	7.2	59	7.3	18	.9	Legitimate medical
Not classified	71	9.0	73	9.1			
Total	790	100.0	806	100.1	1,958	100.0	

It will be noted that two-thirds of the reasons in the present study could be classified under the general heading of lethargy, namely, procrastination ("I always intended to do it," "I intend to do it next month," etc.), neglect ("I just neglected it," "Never thought much about it," etc.), and inconvenience ("Too hard to get to center," etc.); 50 percent of the failures in Shepard's study could be attributed to lethargy.

Only a negligible number of mothers of unprotected children stated that they were ignorant of the procedures and those few were new arrivals at the clinics. Practically 10 percent stated that their children were too young, even though no children under 6 months of age were considered; some intimated that they were waiting until the child was of school age. Shepard in 1933 found a higher proportion, 20.7 percent, due to ignorance, including "child too young." This may be, at least partly, a reflection of the fact that he made a survey of the general population whereas all the present group of mothers were

under clinic influence. His findings of three times as much definite opposition may also be attributed to the differences in the nature of the groups studied, as well as the differences in sections of the country and time.

Over 7 percent of the reasons fall into the "medical" category. Concerning this fact it should be mentioned that mothers' explanations were classified there even on vague health grounds, for example, "Child has been ill a lot".

In view of the lack of any evidence to suggest that immunization of the parent conduced to acceptance of such procedures for the offspring, it is of interest to determine whether there was any significant difference in the reasons given by these parents to excuse their failure to protect their children and those excuses given by nonimmunized parents. Such data are presented in table 11. Only one substantial

TABLE 11.—*Reasons given for failure to vaccinate and immunize according to whether or not the mother had been protected*

Reasons	Failure to vaccinate		Failure to immunize	
	Mothers vaccinated	Mothers not vaccinated	Mothers immunized	Mothers not immunized
	Percent	*Percent*	*Percent*	*Percent*
Procrastination	41.4	39.8	44.8	37.4
Neglect	22.6	24.1	19.1	26.2
Inconvenience	2.3	[illegible].3	.7	3.3
Ignorance of procedure	.2	.8	.7	.2
Thought child too young	10.2	6.8	9.7	8.7
Prejudice	5.0	12.0	7.3	6.0
Ignorance of free facilities	1.5	1.5	.7	1.9
"Medical reasons"	7.6	5.3	8.0	7.2
Not classified	9.4	7.5	9.0	9.1
Total	100.2	100.1	100.0	100.0
Number studied [1]	660	133	288	484

[1] Totals here apply to number of mothers who had one or more children over 6 months of age not vaccinated or not immunized.

variation is noted, and even that is not as large as one might expect; 12 percent of the mothers who had not themselves been vaccinated gave prejudice against the procedure as a reason whereas only 5 percent of the mothers who had been vaccinated gave it as a reason. In the case of immunization there seemed to be no difference between the two groups with regard to prejudice against the procedure.

DISCUSSION

The data here reported are based on a narrow and not too typical section of the general population, but one in which the average health program finds its greatest need and upon which it concentrates its greatest emphasis. The findings, though requiring confirmation in other groups and possibly not typical of any group other than that here studied, have, however, certain implications as to the educa-

tional value of immunization against diphtheria and smallpox. They fail to show that the person who has been immunized has, through this mere fact, learned the value of the procedure to any greater degree than has the person who did not submit to immunization. It should be emphasized that in the majority of instances the immunizations that the parents had received must have been obtained in large school clinics where in all probability more emphasis had been given to the process of getting the child immunized (consent slip, arrangement of clinics, etc.) than to explaining to the child the reasons for such immunization. No deductions are possible as to the educational effect that would have attended an immunization program of any other type.

The data as to the relationship between the immunization, or lack of immunization, of the younger child to that of the older child in a two-child family would strongly suggest that the direct education of the mother at the time of the first child is an important factor in determining the protection of subsequent children. The findings here reported suggest that unless the mother is taught to protect her first-born, she is not likely to protect the younger. This is obviously of greater significance than is the prior immunization experience of the parents themselves and indicates that special emphasis should be directed to this group of mothers.

The failure to show any correlation between the extent of education of the parents and the likelihood of immunization of the children is disappointing though perhaps not unexpected. It would imply that health education as carried on in the high schools had not had a significant effect in shaping the child's subsequent attitude in his parental responsibility for so simple a thing as diphtheria or smallpox protection. One may only speculate as to its effect on other health protection which is less simply measured.

One obvious limitation of the present investigation is the fact that it was based only upon a clinic-attending group. This group was chosen because of ease of collecting data and because it gave a certain control over the amount of specific, immediate pressure for vaccination and immunization. To be more meaningful, however, similar studies ought to be undertaken of other population groups, or even of the general population. One interesting group would be recent graduates of universities or colleges which have been offering vaccination and immunization as part of student health services. Here the procedures would have been performed at an age when they might be expected to exert maximum educational benefit, and definite records of the procedures would be available, thus eliminating the memory factor of the present study.

Most evaluations of health education are based upon knowledge or aptitude tests. The technique used here involves measurement of

actual health behavior, namely, number of children for whom immunization and vaccination had been provided. The question was not "Would you do this?" but "Have you done this?" The latter is obviously a more meaningful test of the results of an educational procedure and would appear to be worthy of more extensive trial.

SUMMARY

This was a study of the relations of certain educational and social influences on the vaccination and immunization status of 3,684 St. Paul children in 1,534 families; at least one child in each family was registered at a Child Health Supervision Clinic.

1. Of the children over 6 months of age, 66.1 percent were vaccinated and 63.9 percent immunized. This tendency for a slightly larger proportion to be vaccinated than to be immunized held quite generally for separate age groups, except for children 6 years of age. Practically one-half the vaccinations and immunizations had been performed before the age of 3 years.

2. There was a slightly higher frequency of protection against both smallpox and diphtheria among females than among males, but the statistical significance of the difference is questionable.

3. If either the mother or father had been vaccinated there was a slightly greater probability that the child would be vaccinated than if the parents had not been protected. However, the fact that either parent was inoculated against diphtheria did not increase the chances that the children would be immunized.

4. There was no measurable relation between the severity of a mother's reaction to vaccination or immunization and whether or not the child was protected.

5. In two-child families where the younger child was over 6 months of age, if the older sibling was vaccinated, 54 percent of the younger siblings were protected. Almost exactly parallel rates were found for diphtheria immunization. If the older sibling was not immunized, only 1.2 percent of the younger siblings were protected.

6. Children whose mothers attended only grade school were vaccinated and immunized to a greater extent than were children whose mothers attended high school. The difference could not be wholly attributed to the fact that grade school mothers had larger families and older children.

7. A rough classification of the reasons given by mothers for failure to have their children immunized and vaccinated revealed that procrastination and neglect accounted for over 60 percent of the failures.

8. No substantial differences were noted in the reasons given for failure to have children protected, according to whether or not the mothers had been vaccinated or immunized.

REFERENCES

(1) Collins, S. D.: History and frequency of smallpox vaccinations and cases in 9,000 families. Pub. Health Rep., 51:433 (April 17, 1936).
(2) Collins, S. D.: History and frequency of diphtheria immunizations and cases in 9,000 families. Pub. Health Rep., 51:1736 (December 18, 1936).
(3) Palmer, G. T., and Derryberry, M.: Medical and public health attitudes toward smallpox vaccination and diphtheria immunization. New Eng. J. Med., 211:413 (August 30, 1934).
(4) Shepard, W. B.: Obstacles in the no-diphtheria path. Am. J. Pub. Health, 23:547 (June 1933).

EXPERIMENTS IN THE COOKING OF GARBAGE FOR THE DESTRUCTION OF TRICHINAE IN PORK SCRAPS[1]

By WILLARD H. WRIGHT, *Chief of Division of Zoology*, and JOHN BOZICEVICH, *Zoologist, United States Public Health Service*

During the past several years many inquiries have been received from public health officials concerning methods of cooking garbage before its consumption by swine as a means of controlling human trichinosis. The present experiments were carried out with the view of providing information which could be employed in the framing of regulations for the heating of garbage for the destruction of trichina larvae.

Ransom and Schwartz (*1*) reviewed the literature on the effects of heat on the infective larvae of *Trichinella spiralis* and conducted a series of experiments in which it was found that the vitality of these larvae was quickly destroyed by exposure to a temperature of 55° C. gradually attained, and further that exposure to temperatures in the neighborhood of 50° C. for a sufficient period of time rendered the larvae nonviable. More recently Otto and Abrams (*2*) confirmed these results.

The findings of Ransom and Schwartz formed the basis of Federal meat inspection regulations governing the processing of certain pork products for the destruction of trichinae. However, the data do not provide an answer to the question of how long garbage should be cooked in order to destroy trichinae in pieces of pork of various sizes contained in the material.

EXPERIMENTAL PROCEDURE

In a recent paper one of the authors (*3*) discussed the various methods which have been employed for the heat treatment of garbage and concluded that the cooking of garbage in an open container is the most practical and least expensive of these various processes. In fact, this would appear to be the method employed by most of the hog feeders who are cooking garbage at the present time. In view of these facts, the present experiments were carried out by introducing

[1] From the Division of Zoology, National Institute of Health.

infected pork into garbage cooked by means of steam in an open container.

Through the courtesy of Dr. J. LeRoy Wright, former warden, and Harold E. Donnell, acting warden of the Maryland House of Correction, Jessups, Md., permission was granted to use the cooking equipment of that institution for these experiments. This equipment consists of a steam boiler and two steel cooking tanks, along the bottom of each of which is placed a single steam pipe provided with numerous apertures through which the steam escapes into the garbage. The container used for these experiments was a cylindrical tank 10 feet in length and 3 feet in diameter, and having a capacity of 525 gallons. The top portion of the tank was cut away and covered customarily with a single piece of corrugated iron roofing. During these experiments no cover was used. The boiler carries 70 pounds of steam at full head but the cooking was done with 60 pounds of steam. The garbage employed in these tests had been collected from Camp Meade, Md., early in the morning of the day of each experiment and was placed in the cooking tank on arrival of the truck at the institution. In each experiment approximately 300 gallons of garbage were placed in the tank and water added to bring the contents to a semifluid consistency.

The trichinous pork was obtained from a cross-bred Poland China hog which was received on April 27 and infected with trichinae on April 28 and June 9. On receipt the animal weighed 103 pounds and at the time of butchering on July 29 weighed 180 pounds. The carcass was divided in the usual manner and various cuts were trimmed to provide pieces of different sizes for use in the experiment. Counts of trichina larvae were made on samples obtained from various parts of the carcass. On direct microscopic examination of press preparations, the diaphragm was found to contain an average of 299 larvae per gram, a ham 248 per gram, a shoulder 261 per gram, and a loin 128 per gram. Digestion of 50 grams of diaphragm in artificial gastric juice revealed an average of 303 larvae per gram. Between the time of butchering on July 29 and the time of the first experiment on August 4 and the second on August 10, the pork was kept in a cold room maintained at 10° C. On the day of each experiment the pork was removed from the cold room and was exposed to air temperatures for approximately 3 hours before cooking. Consequently, the samples had lost most of their chill at the time they were introduced into the garbage in the cooker.

The size and thickness of the pork samples were restricted somewhat by the size of the cuts available. Data concerning the dimensions, cubic measurement, and weight of the samples in the various experiments are given in table 1. Discrepancies in the weight of samples having identical dimensions may be explained on the basis

TABLE 1.—*Dimensions, cubic measurement, and weight of samples of trichinous pork employed in garbage cooking experiments*

Sample number	Dimensions (*inches*)	Cubic measurement (*inches*)	Weight (*grams*)
SERIES I			
A-1	6×6×4.5	162	2207
A-2	5×5×4.5	112.5	1133
A-3	4×4×2.5	40	477
A-4	3×3×3	27	331
A-5	2×2×2	8	169
A-6	1×1×1	1	24
B-1	6×6×4.5	162	2249
B-2	5×5×2.5	62.5	1102
B-3	4×4×2.5	40	451
B-4	3×3×3	27	314
B-5	2×2×2	8	169
B-6	1×1×1	1	24
C-1	6×6×4.5	162	2207
C-2	5×5×2	50	792
C-3	4×4×3	48	466
C-4	3×3×3	27	340
C-5	2×2×2	8	159
C-6	1×1×1	1	28
E-1	4×4×2.5	40	781
E-2	3×3×3	27	394
E-3	2×2×2	8	156
E-4	1×1×1	1	25
F-1	4×4×2.5	40	603
F-2	3×3×3	27	367
F-3	2×2×2	8	155
F-4	1×1×1	1	20
SERIES II			
D-1	6×5×3	90	1568
D-2	6×6×2.5	90	1092
D-3	4×3×3.5	42	487
D-4	3×3×3	27	488
D-5	3×3×3	27	485
G-1	6×5×4	120	2056
G-2	5×4×3	60	666
H-1	3×3×3	27	342

of texture of the cut and the presence or absence of bone. Each sample was wrapped in cheese cloth and a heavy cord attached so that the sample could be removed at will from the cooker. A meat thermometer was inserted into the center of each sample and kept there during the entire course of the experiments. Temperature readings were made at intervals in accordance with the plan of the experiment, as explained later. The thermometers were furnished through the cooperation of Miss Lucy Alexander, Bureau of Home Economics, United States Department of Agriculture. Each thermometer had been tested and calibrated by the United States Bureau of Standards and correction figures were available.

Following the cooking of the trichinous pork in the garbage, the samples were brought to the laboratory. The following day they were ground in a food chopper and a composite 50-gram sample, or as much as was available, was fed to 5 albino rats which had previously

been tattooed with the sample number. In addition, in those samples in which this amount remained, a composite 50-gram sample was digested in artificial gastric juice overnight in the warm room at 37° C., during which time it was stirred constantly by a motorized mechanical stirring apparatus. On the following day counts of larvae were made on the samples after the supernatant fluid had been siphoned off.

In the two series of experiments the rats were killed 46 and 48 days, respectively, after date of infection. The diaphragms were examined for trichinae, the skinned and eviscerated carcasses were ground in a food chopper, and a composite 50-gram sample was digested in artificial gastric juice overnight in the same manner as indicated above. The following day larval counts were made on each sample. A series of control samples was handled in exactly the same manner except that these samples were not cooked but were maintained in the cold room until used. Some of the rats receiving trichinous meat from some of the samples died during the period of the experiment. In a few cases, the carcasses were badly decomposed because death occurred over the week end, while in other cases the carcasses were consumed by other rats in the cage. Whenever possible, rats which succumbed during the experiment were examined for adult and larval trichinae.

In making counts of larvae in the samples of cooked pork and the trichinous rats, total counts were made when the number of larvae was relatively small. In other cases dilution counts were conducted, 5 counts on quantities of 2 cc. each being made from 200 cc. of the digest containing all the larvae from pork samples and a similar number of counts on similar samples from 1,000 cc. of the digest containing the larvae from the rats. The figures given in the tables are the mean of the respective counts. With the inherent errors in dilution counting in general and the small number of samples taken in the present case, naturally the figures are not statistically significant. However, neither the objectives of the experiment nor the conclusions derived demand statistical validity and the counts are given merely to show roughly the relative degree of infection.

SERIES I

Five lots of samples were employed in this series of experiments. Sample lots A, B, E, and F were cooked with the garbage while sample lot C was used as a control. The experimental samples were distributed throughout the tank and immersed in the garbage so that they were entirely covered. The samples were placed in the garbage while it was still cold and before steam was turned into the tank. Samples in lot A were removed from the tank 30 minutes after the garbage came to a boil; samples in lot B were removed at 20 minutes; samples in lot E at 15 minutes; and samples in lot F at 10 minutes. Temper-

ature readings were first taken at the time of removal of the various samples from the cooking tank and thereafter at 5-minute intervals until no further rise was noted. Table 2 gives information concerning the temperatures reached in the interior of the samples. Correction figures for the thermometers have not been recorded since these figures were so small as not to influence the correlations or results.

During the early stages of cooking it was noted that the temperature in different parts of the garbage showed considerable variation. Pockets were formed in the mass of garbage through which the steam escaped to the surface. In these pockets the temperature reached

TABLE 2.—*Temperature reached in the interior of samples of trichinous pork in garbage at various intervals after the material began to boil (series I)*

[Temperature ° C.]

Sample number	Intervals in minutes after material came to boil									
	10	15	20	25	30	35	40	45	50	55
A-1	--	--		--	34	35	35	35	37	36
A-2	--		--	--	38	43	46	48	50	50
A-3	--			--	33	37	37	35		--
A-4		--	--	--	38	42	44	50		37
A-5	--	--		--	78	79	74	66	49	--
A-6	--	--	--	--	98	83	66	56		--
B-1	--	--	23	23	22	22	--	--	--	--
B-2	--	--	55	56	56	56	55	--	--	--
B-3	--	--	22	24	25	25	--	--	--	--
B-4	--	--	52	57	61	62	55	--	--	--
B-5	--	--	74	78	75	68	--	--		--
B-6	--	--	100	80	56	48	--			--
E-1	--	42	44	45	46	46	--		--	--
E-2	--	23	27	28	28		--		--	--
E-3	--	28	29	30	31	--	--	--	--	--
E-4	--	94	81	60	58	--	--	--	--	--
F-1	22	22	21	21	--	--	--	--		--
F-2	33	38	46	46	--	--		--	--	--
F-3	67	70	68	62	--	--			--	--
F-4	35	30	30	28	--	--	--	--	--	--

100° C. while in other areas, particularly in the distal portion of the tank away from the steam inlet, the temperature failed to register to the boiling point. These discrepancies disappeared as the cooking progressed. However, since the experimental cooking time was reckoned from the moment the garbage first began to boil, there was some variation in the temperature in various parts of the garbage at this period and such variation no doubt influenced the result in the case of some of the samples.

It will be seen from table 3 that there was no close correlation between the destruction of the larvae and the size of the various samples in the lots cooked for different periods of time. In fact, most consistent results were obtained in lot B samples, of which 4 of the 6 samples produced no infection in the rats even though lot B samples were in boiling garbage for only 20 minutes whereas lot A samples were held for 30 minutes. However, all samples which reached an

Table 3.—*Results of examination for trichinae of 50-gram composite samples of voluntary muscle from rats fed trichinous meat cooked with garbage (series I)*

Sample number	Number of rats dying before end of experiment	Findings of trichinae in dead rats	Number of rats examined at end of experiment	Larvae recovered from 50-gram sample from rats: Total number	Larvae recovered from 50-gram sample from rats: Number per gram	Number larvae per gram in pork fed to rats: Coiled	Number larvae per gram in pork fed to rats: Uncoiled	Highest temperature (° C.) reached in cooked pork fed to rats
A-1	4	Adults	1	None	None	70	16	37
A-2	0		5	16	0.32	2	7	50
A-3	0		4	316,400	6,328	171	[illegible]	37
A-4	0		5	1,140	22.8	3	8	50
A-5	0		5	None	None	None	[1] None	79
A-6	2	None	3	None	None	No sample		98
B-1	3	Adults	1	131,860	2,637	46	41	23
B-2	1	None	3	None	None	None	25	56
B-3	1	904,600	4	331,360	6,627	120	16	25
B-4	2	None	3	None	None	2	24	62
B-5	0		5	None	None	None	None	78
B-6	2	Rats eaten	3	None	None	No sample		100
C-1	0		5	281,600	5,632	No digest		Control, not cooked.
C-2	5	481,200 to 844,400	0					
C-3	3	209,600 to 1,685,000	1	63,000	1,260			
C-4	4	113,200 to 1,212,400	1	181,600	3,632			
C-5	2	Adults	3	72,833	1,456			
C-6	3	Adults and larvae	2	203,000	4,060			
E-1	2	1—no adults, 2—86,812	3	170,700	3,414	22	50	46
E-2	3	82,000 to 632,200	2	391,000	7,820	8	12	28
E-3	5	Adults in 1, larvae in 3	0			22	17	31
E-4	1	None	[2] 3	16	0.[illegible]	No sample		94
F-1	2	Adults	3	111,800	2,236	56	17	22
F-2	0		5	122,800	2,456	33	13	46
F-3	2	None	3	None	None	None	4	70
F-4	1	Rat eaten	4	56,800	1,136	No sample		35

[1] Only digested fragments of larvae were recovered from this sample.
[2] Diaphragms of these 3 rats were negative for trichina larvae, finding of larvae in the 50-gram composite sample was probably due to contamination from infected sample.

internal temperature of 56° C. or more failed to produce infection in rats. The results with sample E–4 are anomalous in view of the internal temperature reached. The diaphragms of the 3 rats were free of trichinae, and contamination during examination of the digested material was ruled out by the fact that separate pieces of sterile glassware were used for each sample. The 16 larvae recovered from the digest were coiled and viable and obviously represented a contamination which was later traced to a probable inadvertence on the part of the attendant who prepared the various samples for digestion.

The variable results obtained in this experiment were no doubt due to conditions previously mentioned wherein the temperature reached in various parts of the tank varied considerably during the early stages of the cooking. A temperature of 100° C. was recorded more generally in the proximal portion of the tank near the steam inlet than toward the rear of the tank in spite of the fact that the steam

line reached to the farther end of the receptacle. Even in the proximal portion, however, some parts of the garbage had not come to a boil even though portions in the distal end were already boiling. No doubt heat distribution would have been more uniform throughout had the material been stirred at intervals in accordance with the usual custom at this plant. Stirring could not be carried out during the experiment because of the danger of misplacing the samples and breaking the thermometers inserted therein. Furthermore, had the samples been placed deeper in the mass of garbage instead of in the top layer, no doubt a higher internal temperature would have been reached.

SERIES II

In this series of experiments the samples were handled in the same manner as those in series I with the exception that the steam was turned off after the garbage had boiled for 30 minutes. The samples were then allowed to remain in the tank for an additional period of 60 minutes while the garbage was cooling. It was necessary to remove the samples after this elapsed time in order not to disrupt the routine of the plant since the tank was needed for cooking additional lots of garbage during the day. The procedure employed in this experiment was in keeping with the usual method of handling cooked garbage in hog feeding plants, since it is customary to allow the garbage to cool in the cooking vat or other receptacle before feeding it to hogs.

Table 4 is a record of the internal temperatures reached in the various samples while table 5 gives the results of the cooking tests. In this experiment the temperatures recorded in the various samples 30 minutes after the garbage came to a boil showed the same marked variations as recorded in the series I experiment. However, after the steam was turned off, the internal temperature of the samples rose consistently until it was sufficient to destroy all trichinae with the

TABLE 4.—*Temperature reached in the interior of samples of trichinous pork in garbage at various intervals after the material began to boil (series II)*

[Temperature ° C]

Sample number	Intervals in minutes after material came to boil								
	30	40	50	60	70	80	90	[1] 110	[1] 115
D-1	22	23	32	39	46	57	59	64	64
D-2	70	76	78	80	82	83	84	78	-------
D-3	28	36	48	52	66	70	76	74	-------
D-4	78	80	82	84	86	89	86	60	-------
D-5	65	71	80	87	88	86	75	68	-------
G-1	*Below* [2] 30	*Below* [2] 30	*Below* [2] 30	30	38	43	49	52	52
G-2	68	69	78	82	85	86	86	80	-------

[1] All samples were removed from the cooking vat at 90 minutes after the garbage started to boil. The temperatures recorded for 110 and 115 minutes were those reached after the samples were in the open air.

[2] In sample G-1 the mercury was below the level of the surface of the meat and the lower temperatures could not be read.

TABLE 5.—*Results of examination for trichinae of 50-gram composite samples of voluntary muscle from rats fed trichinous meat cooked with garbage (series II)*

Sample number	Number of rats dying before end of experiment	Findings of trichinae in dead rats	Number of rats examined at end of experiment	Larvae recovered from 50-gram sample from rats: Total number	Larvae recovered from 50-gram sample from rats: Number per gram	Number larvae per gram in pork fed to rats: Coiled	Number larvae per gram in pork fed to rats: Uncoiled	Highest temperature (° C.) reached in cooked pork fed to rats
D-1	None		5	None	None	None	9	64
D-2	None		5	None	None	None	None [1]	84
D-3	None		5	None	None	None	None [1]	76
D-4	1	Badly decomposed	4	None	None	None	None [1]	89
D-5	None		5	None	None	None	None [1]	87
G-1	None		5	50,500	1,010	17	50	52
G-2	None		5	None	None	None	None [1]	86
H-1	1	680,200	4	123,200	2,464	39	207 [2]	Control; not cooked.

[1] Only digested fragments of larvae were recovered in these samples

[2] Most of these larvae were coiled and very active when first isolated, they uncoiled during the course of the day while being collected in cold water so that counts could be made of the total number isolated.

exception of those in the largest sample (G–1). However, the internal temperature within this sample increased after the sample was removed from the cooking tank and it seems probable that the temperature would have reached 55° C., the lethal temperature for trichina larvae, had the sample been allowed to remain in the garbage while further cooling was taking place. In view of this probability and the fact that all larvae were killed in cuts of pork having a thickness up to 3 inches, it would seem that the boiling of garbage for a period of 30 minutes and permitting it to cool before feeding the material to swine would constitute a procedure sufficient for the destruction of trichinae in pieces of pork contained therein. However, in arriving at this conclusion one should not ignore the possibility of a less rapid penetration of heat into scraps of pork previously cooked, a matter concerning which little or no information is available.

In spite of this possibility, by and large, the size of the pork samples employed in these experiments probably exceeded the size of pork scraps commonly encountered in garbage. For this reason it is believed that the conditions set up in these experiments were sufficiently severe to provide data which could be interpreted with an adequate margin of safety for the purpose of formulating regulations for the control of trichinosis.

SUMMARY AND CONCLUSIONS

In order to determine the minimum time required for the cooking of garbage to destroy trichinae in pork scraps contained therein, tests were carried out by introducing into garbage cooked by steam in an open tank pieces of trichinous pork varying in dimensions from 1 x 1 x 1 inch to 6 x 6 x 4.5 inches and in weight between 20 grams

(0.04 pound) and 2,297 grams (5.06 pounds). The samples were placed in the garbage while it was still cold and before the steam was turned into the tank. In series I, the samples were held in the tank for respective periods of 10, 15, 20, and 30 minutes after the garbage came to a boil. In series II experiments, the samples were introduced into the cold garbage, the steam was turned off after the garbage had boiled for 30 minutes, and the samples were not removed until 60 minutes later. The internal temperature of each sample was ascertained by means of a meat thermometer inserted into the center of the sample. Representative samples from the cooked pork and uncooked control samples were digested in artificial gastric juice and examined for trichina larvae while other samples were fed to rats which were killed after a suitable period and examined for larvae.

In the series I experiments considerable variation was noted in the degree of internal heat reached within the pieces of pork and such variation was not always correlated with the size of the sample or the length of cooking. The variation was no doubt due to the fact that the temperature throughout the mass of the garbage was not uniform. The fact that the garbage was not stirred during the course of the experiment probably accounted in part for the uneven temperature distribution.

In the series II experiments, all larvae were killed in all samples with the exception of the largest which measured 6 x 5 x 4 inches and weighed 2,056 grams (4.5 pounds). In both series of experiments no larvae survived when the internal temperature of the sample reached 56° C.

The results of these experiments warrant the conclusion that the boiling of garbage for 30 minutes in an open container will effect the destruction of trichina larvae in pieces of pork up to 3 inches in thickness and probably in pieces of pork of greater thickness provided the garbage is allowed to cool gradually. Such procedure would seem to constitute an effective measure for preventing the transmission of trichina infection to swine maintained on garbage and thus aid in the control of swine trichinosis primarily and human trichinosis secondarily.

REFERENCES

(1) Ransom, B. H., and Schwartz, Benjamin: Effects of heat on trichinae J. Agric. Research, **17**: 201 221 (1919).

(2) Otto, G. F., and Abrams, Evelyn: Quantitative studies on the effect of heat on trichina (*Trichinella spiralis*) larvae. Am. J. Hyg., **29**, Sec. D.: 115–120 (1939).

(3) Wright, Willard H.: Public health problems encountered in the disposal of garbage by feeding it to swine. Am. J. Pub. Health (in press).

INFECTIOUS HEPATITIS AND INFECTIOUS KERATO-CONJUNCTIVITIS PROVISIONALLY ADDED TO MANUAL "CONTROL OF COMMUNICABLE DISEASES"

The importance has recently been recognized of two communicable diseases not previously included in the manual "Control of Communicable Diseases" sponsored jointly by the Public Health Service and the American Public Health Association (Reprint No. 1697 from the Public Health Reports, revised 1940). These two diseases are infectious hepatitis (formerly known as acute catarrhal jaundice) and infectious kerato-conjunctivitis (also known as superficial punctate keratitis or nummular keratitis). At a recent meeting of the committee which prepared the 1940 revision, it was recommended that these two diseases be added to the manual. Descriptions follow:

Hepatitis, Infectious (Acute Catarrhal Jaundice)

1. *Recognition of the disease*.—An acute infection characterized by a prodromal period of from less than a day to about a week, following which jaundice of more or less severity occurs. The prodromal symptoms include headache, abdominal pain, malaise, anorexia, nausea, and vomiting. Fever is usually present although it may be so slight as to be missed. Toward the end of this period bile may be detected in the urine, and jaundice of minimal to marked intensity is soon noted, persisting for days or weeks. A leukopenia with relative lymphocytosis may be present. Convalescence is of variable length. There is considerable variation in the degree of severity of the disease, ranging from anicteric cases to cases of acute yellow atrophy of the liver. A similar clinical picture has been observed following certain industrial intoxications, antisyphilitic treatment, and several immunization procedures, but the relation of these clinical conditions to infectious hepatitis has not been determined.
2. *Etiological agent*.—Unknown
3. *Source of infection*.—Probably discharges from the nose and mouth of infected individuals. There may be carriers.
4. *Mode of transmission*.—Presumably through direct contact with infected persons and carriers of the disease. Alimentary infection may be a factor but the evidence in this direction is scanty.
5. *Incubation period*.—Usually from 21 to 35 days.
6. *Period of communicability*.—Relatively short. About 1 week and apparently not more than 2 weeks.
7. *Susceptibility and immunity*.—Most common among children. Cases have been observed among individuals of all age groups. The disease is, in most instances, of longer duration and greater severity among adults than among children. Second attacks have been rare, relapses uncommon.
8. *Prevalence*.—Epidemics are most commonly reported from rural areas and from institutions. Most outbreaks begin during the fall and winter months.
9. *Methods of control*
   - A. The infected individual, contacts, and environment.
     1. Recognition of the disease and reporting: By clinical symptoms.
     2. Isolation: During the first week of illness.
     3. Concurrent disinfection: Discharges of nose and throat of patient.
     4. Terminal disinfection: None
     5. Quarantine: None.
     6. Immunization: None.
     7. Investigation of source of infection: Desirable to detect and isolate other cases.
   - B. General measures:
     Physicians of the vicinity should be informed when this disease is prevalent.

Kerato-Conjunctivitis, Infectious (Superficial Punctate Keratitis; Nummular Keratitis)

1. *Recognition of the disease.*—Acute onset usually with sensation as of foreign body under the upper lid. Edema of lids, scleral injection, follicular hypertrophy of palpebral conjunctiva, enlargement and tenderness of pre-auricular lymph node with a watery discharge, followed in few or many of the cases by multiple pin-point corneal opacities. Involvement usually unilateral.
2. *Etiological agent.*—Considered to be a specific filterable virus.
3. *Source of infection.*—Probably the discharge from the eye of an infected person or a carrier.
4. *Mode of transmission.*—Apparently contact with an infected person or carrier or with articles freshly soiled with discharges of such person.
5. *Incubation period.*—Not definitely established but probably about 5 days.
6. *Period of communicability.*—Unknown but certainly during acute stage of the disease.
7. *Susceptibility and immunity.*—Susceptibility variable. No age, sex, or race known to be immune.
8. *Prevalence.*—Occurs in epidemic form in warm climates, also among industrial employees in temperate climates, involving a small percentage of the individuals in the groups affected.
9. *Methods of control:*

   A. The infected individual, contacts, and environment:
   1. Recognition of the disease: Clinical course confirmed by smears of conjunctival scrapings showing mononuclear cells and none of the usual etiologic agents of other forms of conjunctivitis.
   2. Isolation: None, provided hygienic measures are taken by the infected person.
   3. Concurrent disinfection: Disinfection or destruction of conjunctival and nasal disharges and articles soiled therewith.
   4. Terminal disinfection: None.
   5. Quarantine: None.
   6. Immunization: None.
   7. Investigation of source of infection: To locate other cases and institute precautions at home or working place.

   B. General measures:
   1. Education as to personal cleanliness and as to danger of use of common towels and toilet articles.
   2. Avoidance of contact of hands with conjunctival or nasal discharges.

DEATHS DURING WEEK ENDED FEBRUARY 20, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Feb. 20, 1943	Corresponding week, 1942
Data from 87 large cities of the United States.		
Total deaths	10,267	9,399
Average for 3 prior years	9,254	
Total deaths, first 7 weeks of year	70,639	64,661
Deaths under 1 year of age	673	573
Average for 3 prior years	527	
Deaths under 1 year of age, first 7 weeks of year	4,977	3,912
Data from industrial insurance companies		
Policies in force	65,363,449	64,912,414
Number of death claims	13,574	14,116
Death claims per 1,000 policies in force, annual rate	10 8	11 3
Death claims per 1,000 policies, first 7 weeks of year, annual rate	10.7	10.2

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 27, 1943

Summary

For the current week 484 cases of meningococcus meningitis were reported (exclusive of a delayed report of 19 cases in Virginia), as compared with 398 for the preceding week and 403 for the next earlier week. The accumulated total for the first 8 weeks of the year is 2,959, nearly seven times the comparable 5-year (1938–42) median (437). The largest number of cases recorded for the comparable period of the past 16 years was 1,942, reported in the first 8 weeks of 1930. The current reports show increases in all of the nine geographic divisions except the New England, East North Central, and Pacific groups. States reporting the largest numbers were New York 43, California 36, New Jersey 35, Pennsylvania 30, Missouri and Virginia 27 each, Mississippi 23, and Alabama 21.

There were 17,754 cases of measles reported for the week, as compared with 16,334[1] for the preceding week and a 5-year median of 16,918. The largest numbers continued to be reported in the three Middle Atlantic States—Pennsylvania 3,398, New York 1,596, and New Jersey 1,109. The accumulated total for the first 8 weeks of the year is 96,436, as compared with the corresponding 5-year median of 97,528, the number reported for this period in 1942.

Increased incidence as compared with the preceding week was shown in the reports of diphtheria, 294 cases, influenza, 5,096, scarlet fever, 4,365, and whooping cough, 3,898, although the figures for these diseases are below the respective 5-year medians.

Other reports for the week included 1 case of anthrax, 386 cases of dysentery, 9 of infectious encephalitis, 16 of tularemia, and 37 cases of endemic typhus fever.

Deaths in 89 large cities of the United States for the week totaled 10,290, as compared with 10,336 for the preceding week. The accumulated total for the first 8 weeks of the year is 81,377, as compared with 74,203 for the corresponding period in 1942.

[1] Later information shows a total of 16,334 cases of measles for the week ended Feb. 20, 1943, instead of 15,482 as stated in the summary for that week. (See p. 364, PUBLIC HEALTH REPORTS, Feb. 26, 1943.)

Telegraphic morbidity reports from State health officers for the week ended February 27, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	Feb 27, 1943	Feb 28, 1942		Feb 27, 1943	Feb 28, 1942		Feb 27, 1943	Feb 28, 1942		Feb 27, 1943	Feb 28, 1942	
NEW ENG												
Maine	0	0	0	1	9	9	8	177	138	17	1	0
New Hampshire	0	1	0	--	--	--	51	8	15	0	2	0
Vermont	0	0	0	--	--	--	349	4	5	1	0	0
Massachusetts	1	2	2	--	--	--	743	411	376	13	5	2
Rhode Island	0	1	0	1	1	--	34	176	15	17	0	1
Connecticut	1	1	1	1	3	5	437	238	185	4	6	0
MID ATL												
New York	22	27	26	[1] 10	[1] 13	[1] 44	1,596	723	1,273	43	11	5
New Jersey	1	3	10	10	15	42	1,109	208	208	35	2	1
Pennsylvania	16	12	25	5	--	--	3,398	1,027	1,027	30	3	5
E. NO CEN.												
Ohio	7	10	17	10	24	24	217	177	177	6	3	1
Indiana	3	6	13	40	21	29	421	87	87	5	1	0
Illinois	13	19	23	31	12	54	553	376	376	12	3	2
Michigan [2]	4	4	7	--	--	2	285	150	447	12	0	0
Wisconsin	1	0	2	49	63	183	834	510	662	6	0	0
W. NO CEN.												
Minnesota	5	6	1	--	3	7	42	758	291	0	0	0
Iowa	2	4	4	2	8	42	276	289	159	1	0	0
Missouri	7	3	8	3	4	42	423	400	78	27	1	1
North Dakota	0	0	1	20	6	23	67	42	12	0	0	0
South Dakota	4	1	1	1	--	1	107	7	5	0	1	0
Nebraska	5	3	3	39	--	--	247	108	33	1	0	0
Kansas	5	3	4	6	17	45	320	343	322	5	2	0
SO ATL.												
Delaware	0	4	1	1	--	--	25	2	2	1	0	0
Maryland [2]	4	1	2	4	21	103	38	385	77	15	6	2
Dist of Col	0	0	5	2	2	8	94	44	19	2	2	1
Virginia	10	15	17	803	987	1,604	436	177	223	[3] 46	6	3
West Virginia	2	4	8	15	42	69	17	352	189	3	5	3
North Carolina	11	10	10	50	36	64	56	1,606	1,430	13	0	0
South Carolina	6	3	4	986	950	959	44	260	237	9	1	1
Georgia	6	2	5	106	147	147	65	419	349	3	0	1
Florida	10	3	5	4	13	13	20	222	145	12	0	0
E. SO. CEN.												
Kentucky	7	5	9	11	104	115	865	55	55	9	1	2
Tennessee	4	3	7	57	--	152	316	226	133	11	5	3
Alabama	11	6	13	389	620	620	60	172	258	21	3	3
Mississippi [2]	9	9	6		--	--	--	--	--	23	1	1
W SO CEN												
Arkansas	5	11	9	102	395	286	122	314	107	4	1	1
Louisiana	7	1	6	12	11	11	99	83	18	4	1	1
Oklahoma	6	6	6	155	93	218	57	393	83	5	1	1
Texas	34	36	38	1,606	1,667	1,667	697	1,843	414	16	7	1
MOUNTAIN												
Montana	2	3	2	--	11	11	129	125	33	1	1	0
Idaho	4	1	1	--	--	1	88	34	34	1	0	0
Wyoming	0	0	2	85	302	--	147	119	36	0	1	0
Colorado	12	1	8	53	64	61	445	228	147	3	1	1
New Mexico	0	0	1	5	1	3	28	112	81	2	0	0
Arizona	1	3	3	147	156	156	14	182	21	3	0	0
Utah [2]	0	0	0	103	13	19	384	111	155	3	0	0
Nevada	0	0	--	--	--	--	6	61	--	5	0	--
PACIFIC												
Washington	3	2	2	--	3	3	999	111	141	11	0	1
Oregon	1	2	2	80	21	37	505	132	132	6	0	0
California	42	6	23	91	126	126	481	2,931	408	36	3	2
Total	294	243	369	5,096	5,984	8,987	17,754	16,918	16,918	[3] 503	87	51
8 weeks	2,480	2,639	3,395	36,354	39,064	39,064	96,436	97,528	97,528	2,959	503	437

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended February 27, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1938-42	Week ended—		Median 1938-42	Week ended—		Median 1938-42	Week ended—		Median 1938-42
	Feb 27, 1943	Feb 28, 1942		Feb 27, 1943	Feb 28, 1942		Feb 27, 1943	Feb 28, 1942		Feb 27, 1943	Feb 28, 1942	
NEW ENG.												
Maine	0	0	0	14	13	13	0	0	0	0	0	0
New Hampshire	0	1	0	13	34	4	0	0	0	0	2	0
Vermont	0	0	0	12	27	15	0	0	0	0	2	0
Massachusetts	0	1	0	531	318	233	0	0	0	1	2	1
Rhode Island	0	2	0	18	24	16	0	0	0	0	0	0
Connecticut	0	0	0	80	37	100	0	0	0	0	1	1
MID ATL.												
New York	0	1	1	645	423	721	0	0	0	5	5	5
New Jersey	1	2	1	134	161	187	0	0	0	1	0	0
Pennsylvania	0	1	1	277	535	535	0	0	0	3	3	5
E. NO. CEN.												
Ohio	1	4	0	275	318	318	0	0	4	3	2	4
Indiana	1	0	1	108	186	186	3	0	2	0	4	2
Illinois	0	1	1	261	327	491	3	0	6	4	1	3
Michigan [2]	1	0	1	124	241	272	0	0	0	1	0	3
Wisconsin	0	1	1	291	170	174	1	1	5	1	0	0
W. NO. CEN.												
Minnesota	1	0	0	68	117	117	0	0	6	0	1	0
Iowa	0	0	0	103	71	102	1	3	10	0	0	1
Missouri	0	0	0	133	146	97	0	2	4	1	1	1
North Dakota	0	0	0	11	30	27	0	0	1	0	0	0
South Dakota	0	0	0	9	34	22	2	[illegible]	1	0	0	0
Nebraska	0	0	0	47	98	47	0		0	0	0	0
Kansas	0	0	0	73	117	117	3	0	3	1	0	0
SO. ATL.												
Delaware	0	0	0	7	39	16	0	0	0	0	0	0
Maryland [3]	0	0	0	102	62	62	0	0	0	0	1	0
Dist. of Col.	0	0	0	35	12	18	0	0	0	0	0	0
Virginia	2	0	2	44	40	40	0	0	0	1	1	2
West Virginia	1	0	1	47	43	44	0	0	0	2	2	2
North Carolina	0	2	2	25	44	47	0	0	0	0	1	1
South Carolina	0	1	0	5	8	5	0	0	0	2	1	3
Georgia	0	0	0	26	20	19	0	0	0	5	14	2
Florida	0	1	1	29	5	5	0	0	0	0	6	2
E. SO. CEN.												
Kentucky	0	0	0	45	73	84	1	1	1	0	1	3
Tennessee	0	1	0	85	80	80	0	1	1	5	3	2
Alabama	0	0	0	18	37	23	0	2	1	1	1	2
Mississippi [3]	0	1	1	12	10	9	0	0	0	2	1	1
W. SO. CEN.												
Arkansas	0	2	1	6	6	9	0	2	2	1	1	1
Louisiana	0	1	0	12	7	12	0	0	0	5	3	7
Oklahoma	0	0	0	28	32	20	0	0	1	2	2	0
Texas	1	3	2	66	55	58	0	1	4	0	2	5
MOUNTAIN												
Montana	0	1	0	22	15	33	0	0	0	0	0	0
Idaho	0	0	0	2	3	10	0	0	0	0	0	0
Wyoming	0	0	0	102	44	8	0	1	0	0	0	0
Colorado	0	0	0	106	42	42	0	0	14	0	0	0
New Mexico	2	0	0	7	3	11	1	0	0	3	0	0
Arizona	0	0	0	12	6	9	0	1	1	1	0	0
Utah [2]	1	0	0	66	43	37	0	0	0	0	0	0
Nevada	0	0	------	2	0	------	0	0	------	0	0	------
PACIFIC												
Washington	0	0	1	62	40	53	0	0	1	0	0	0
Oregon	0	0	0	12	18	24	0	0	0	1	0	1
California	3	2	2	153	125	156	0	0	0	1	1	3
Total	15	29	25	4,365	4,339	4,911	15	16	65	53	65	78
8 weeks	230	209	209	30,413	30,265	35,766	231	170	573	409	645	645

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended February 27, 1943, and comparison with corresponding week of 1942 and 5-year median—Continued.

Division and State	Whooping cough: Week ended— Feb. 27, 1943	Whooping cough: Week ended— Feb. 28, 1942	Whooping cough: Median 1938–42	Week ended Feb. 27, 1943: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhoid fever
NEW ENG.												
Maine	53	37	27	0	0	0	0	0	0	0	0	
New Hampshire	5	0	1	0	0	0	0	0	0	0	0	
Vermont	7	68	23	0	0	0	0	0	0	0	0	
Massachusetts	138	125	125	0	0	0	0	0	0	0	0	
Rhode Island	31	47	39	0	0	0	0	0	0	0	0	
Connecticut	62	60	60	0	0	0	0	0	0	0	0	[illegible]
MID. ATL.												
New York	310	422	410	0	2	6	0	2	0	0	0	[illegible]
New Jersey	176	215	166	0	0	0	0	0	0	0	0	[illegible]
Pennsylvania	352	0	295	1	0	0	0	1	0	0	0	[illegible]
E. NO. CEN.												
Ohio	203	177	177	0	0	0	0	0	0	0	2	[illegible]
Indiana	61	59	25	0	0	0	0	0	0	0	0	[illegible]
Illinois	131	163	105	0	1	1	0	1	0	0	0	[illegible]
Michigan [2]	228	137	197	0	0	0	0	0	0	0	0	[illegible]
Wisconsin	223	199	146	0	0	0	0	0	0	0	0	[illegible]
W. NO. CEN.												
Minnesota	67	40	38	0	0	0	0	0	0	0	0	[illegible]
Iowa	19	12	24	0	0	0	0	0	0	0	0	[illegible]
Missouri	16	32	32	0	0	0	0	1	0	0	0	[illegible]
North Dakota	13	13	10	0	0	0	0	0	0	0	0	[illegible]
South Dakota	0	7	4	0	0	0	0	0	0	0	0	[illegible]
Nebraska	14	12	12	0	0	0	0	0	0	0	0	[illegible]
Kansas	43	39	39	0	0	0	0	0	0	0	0	[illegible]
SO. ATL.												
Delaware	15	0	5	0	0	0	0	0	0	0	0	[illegible]
Maryland [2]	110	46	48	0	0	0	2	0	0	0	0	[illegible]
Dist. of Col.	26	25	17	0	0	0	0	0	0	0	0	[illegible]
Virginia	130	47	65	0	0	0	17	0	0	0	1	[illegible]
West Virginia	39	25	27	0	0	0	0	0	0	0	0	[illegible]
North Carolina	155	126	266	0	3	0	0	0	0	0	0	[illegible]
South Carolina	40	58	68	0	0	1	0	0	0	0	1	[illegible]
Georgia	32	8	23	0	0	0	0	0	0	0	4	[illegible]
Florida	23	14	14	0	1	0	0	0	0	0	0	[illegible]
E. SO. CEN.												
Kentucky	34	53	53	0	0	2	0	0	0	0	0	[illegible]
Tennessee	62	55	55	0	0	0	0	0	0	0	3	1
Alabama	77	25	32	0	0	0	0	0	0	0	0	11
Mississippi [2]	-----	-------	-------	0	0	0	0	0	0	0	0	[illegible]
W. SO. CEN.												
Arkansas	29	6	10	0	0	1	0	0	0	0	1	[illegible]
Louisiana	4	2	12	0	2	0	0	0	0	0	2	4
Oklahoma	15	13	13	0	0	0	0	0	0	0	0	[illegible]
Texas	472	78	111	0	7	317	0	2	0	0	2	[illegible]
MOUNTAIN												
Montana	36	12	15	0	0	0	4	0	0	0	0	0
Idaho	0	5	12	0	0	0	0	0	0	0	0	0
Wyoming	2	4	4	0	0	0	0	0	0	0	0	0
Colorado	18	40	40	0	0	0	0	0	0	0	0	0
New Mexico	15	31	23	0	0	0	1	0	0	0	0	0
Arizona	15	46	37	0	0	0	14	1	0	0	0	0
Utah [2]	25	19	23	0	0	0	0	0	0	0	0	0
Nevada	1	4	-------	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	24	104	101	0	0	0	0	0	0	0	0	0
Oregon	15	31	26	0	0	0	0	0	0	0	0	0
California	332	247	247	0	2	2	0	1	0	0	0	1
Total	3,898	2,988	3,947	1	18	330	38	9	0	0	16	37
8 weeks	30,944	32,255	32,255	---	---	------	----	-- --	------			

[1] New York City only

[2] Period ended earlier than Saturday

[3] Delayed report of 19 cases in Virginia included

WEEKLY REPORTS FROM CITIES

City reports for week ended February 13, 1943

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross-section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga	1	0	39	1	14	1	2	0	7	0	0	4
Baltimore, Md	2	0	5	2	11	9	21	0	53	0	0	54
Barre, Vt	0	0	---	0	0	0	0	0	0	0	0	0
Billings, Mont	0	0	---	0	0	0	2	0	0	0	0	0
Birmingham, Ala	0	0	5	0	0	0	5	0	4	0	0	0
Boise, Idaho	0	0	---	0	2	0	0	0	2	0	0	0
Boston, Mass	0	0	---	1	174	3	24	0	161	0	0	31
Bridgeport, Conn	0	0	---	0	5	0	0	0	6	0	0	0
Brunswick, Ga	0	0	1	0	0	0	1	0	0	0	0	0
Buffalo, N. Y	0	0	---	0	66	0	4	0	11	0	0	21
Camden, N. J	1	0	---	1	0	0	3	0	3	0	0	5
Charleston, S. C	0	0	52	0	4	3	3	0	4	0	0	1
Charleston, W. Va	0	0	---	0	1	0	0	0	0	0	0	0
Chicago, Ill	7	1	5	1	235	4	30	0	71	0	0	65
Cincinnati, Ohio	0	0	1	0	25	0	4	0	48	0	0	10
Cleveland, Ohio	0	0	2	1	5	2	10	0	27	0	0	62
Columbus, Ohio	1	0	---	0	2	0	6	0	12	0	0	3
Concord, N. H	0	0	---	0	1	0	1	0	0	0	0	0
Cumberland, Md	0	0	---	0	0	0	0	0	0	0	0	0
Dallas, Tex	0	0	---	0	0	0	5	0	3	0	0	12
Denver, Colo	3	0	17	0	218	1	10	0	7	0	0	5
Detroit, Mich	1	0	---	2	93	3	19		34	0	0	128
Duluth, Minn	0	0	---	0	1	0	0	0	2	0	0	4
Fall River, Mass	0	0	---	0	6	0	3	0	10	0	0	11
Fargo, N. Dak	0	0	---	0	0	0	0	0	0	0	0	0
Flint, Mich	1	0	---	0	3	0	1	0	1	0	0	7
Fort Wayne, Ind	0	0	---	1	0	0	3	0	1	0	0	0
Frederick, Md	0	0	---	0	0	0	0	0	0	0	0	0
Galveston, Tex	0	0	---	0	8	0	2	0	1	0	0	0
Grand Rapids, Mich	0	0	---	0	1	1	2	0	2	0	0	4
Great Falls, Mont	0	0	---	0	11	0	1	0	0	0	0	10
Hartford, Conn	0	0	1	0	19	0	1	0	2	0	0	0
Helena, Mont	0	0	---	0	16	0	0	0	0	0	0	0
Houston, Tex	5	0	---	1	0	0	8	1	3	0	0	2
Indianapolis, Ind	1	0	---	0	100	0	10	0	22	0	0	14
Kansas City, Mo	2	0	---	4	27	3	8	0	45	0	0	5
Kenosha, Wis	0	0		1	0	0	0	0	2	0	0	0
Little Rock, Ark	0	0	6	0	0	0	1	0	0	0	0	0
Los Angeles, Calif	3	0	23	4	58	4	11	2	13	0	0	30
Lynchburg, Va	0	0	---	0	2	0	0	0	0	0	0	3
Memphis, Tenn	0	0	2	4	19	1	3	0	5	0	0	19
Milwaukee, Wis	0	0	1	1	169	0	4	0	107	0	0	35
Minneapolis, Minn	0	0	---	0	17	1	6	0	5	0	0	19
Missoula, Mont	0	0	---	0	0	0	0	0	2	0	0	0
Mobile, Ala	0	0	---	1	0	0	6	0	0	0	0	0
Nashville, Tenn	0	0	---	0	45	0	6	0	8	0	0	0
Newark, N. J	0	0	3	0	25	1	6	0	7	0	0	12
New Haven, Conn	0	0	---	0	3	0	3	0	1	0	0	2
New Orleans, La	0	0	---	1	8	0	8	0	5	0	1	1
New York, N. Y	13	1	19	2	228	28	83	0	293	0	0	71
Omaha, Nebr	0	0	---	0	10	0	6	0	5	0	0	3
Philadelphia, Pa	1	0	2	1	1,089	6	41	0	89	0	0	53
Pittsburgh, Pa	0	0	10	9	0	0	12	0	9	0	1	20
Portland, Maine	0	0	---	0	2	13	4	0	8	0	0	21
Providence, R. I	0	0	2	0	36	8	10	0	12	0	1	12

City reports for week ended February 13, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Pueblo, Colo	0	0	--	0	2	1	2	0	1	0	0	4
Racine, Wis	0	0		0	15	0	0	0	42	0	0	0
Raleigh, N. C	0	0	-	0	0	0	1	0	0	0	0	6
Reading, Pa	0	0		0	92	1	3	0	2	0	0	4
Richmond, Va	0	0	17	2	6	2	6	0	1	0	0	4
Roanoke, Va	0	0	-----	0	0	0	1	0	0	0	0	0
Rochester, N. Y	0	0	-----	0	23	1	3	0	8	0	0	34
Sacramento, Calif	3	0	----	0	3	0	4	0	6	0	0	4
St. Joseph, Mo	0	0	---	0	0	0	5	0	0	0	0	0
St. Louis, Mo	1	0	1	1	25	3	12	0	15	0	0	10
St. Paul, Minn	0	0	----	1	4	0	3	0	2	0	0	46
Salt Lake City, Utah	0	0		0	47	1	5	0	22	0	0	14
San Antonio, Tex	4	0	1	1	1	0	10	1	1	0	0	8
Savannah, Ga	0	0	35	0	0	0	1	0	0	0	0	0
Seattle, Wash	1	0	-----	0	57	0	9	0	7	0	0	5
Shreveport, La	1	0	--	0	0	0	7	0	2	0	0	0
South Bend, Ind	0	0	--	0	8	0	0	0	1	0	0	0
Spokane, Wash	0	0	1	1	151	2	5	0	2	0	0	2
Springfield, Ill	0	0	---	0	6	0	2	0	11	0	0	27
Springfield, Mass	0	0	-----	0	0	0	2	0	105	0	0	4
Syracuse, N. Y	0	0	-----	1	16	2	6	0	7	0	0	11
Tacoma, Wash	3	0		0	42	1	0	0	0	0	0	0
Tampa, Fla	0	0	--	0	0	1	1	0	0	0	0	0
Terre Haute, Ind	0	0	----	0	0	0	5	0	2	0	0	1
Topeka, Kans	0	0		0	19	0	1	0	1	0	0	5
Trenton, N. J	0	0		0	23	0	3	0	13	0	0	1
Washington, D. C	0	0	3	3	88	6	11	0	28	0	1	17
Wheeling, W. Va	0	0	-----	0	4	0	1	0	0	0	0	3
Wichita, Kans	0	0	---	0	14	0	4	0	2	0	0	4
Wilmington, Del	0	0	-----	0	7	0	5	0	1	0	1	0
Wilmington, N. C	0	0		0	1	0	0	0	1	0	0	2
Winston-Salem, N. C	0	0	1	1	0	0	2	0	0	0	0	25
Worcester, Mass	0	0	---	0	130	5	7	0	14	0	0	8
Total	55	2	255	50	3,543	118	520	4	1,410	0	5	1,008
Corresponding week 1942	71	0	304	44	2,261	9	486	8	1,245	4	14	935
Average, 1938-42	110	----	1,024	¹ 101	² 3,992	-----	¹ 624	-----	1,415	22	17	1,050

Dysentery, amebic.—Cases: Los Angeles, 1.
Dysentery, bacillary.—Cases: Atlanta, 1; Boston, 6; Buffalo, 3; Chicago, 2; Los Angeles, 6; New York, 142.
Dysentery, unspecified.—Cases: Richmond, 1; San Antonio, 4.
Tularemia.—Cases: Nashville, 1.
Typhus fever.—Cases: Galveston, 1; Houston, 1.

¹ 3-year average, 1940-42.
² 5-year median.

PLAGUE INFECTION IN TACOMA, WASHINGTON

Plague infection has been reported proved in specimens of tissue and fleas from rats, *R. norvegicus*, collected in industrial areas in Tacoma, Wash., as follows: In 2 pooled specimens of tissue, each from 2 rats, taken on January 13 and February 4; in a pool of 9 fleas from 20 rats taken on February 8.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended January 30, 1943.—During the week ended January 30, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		16		194	349	70	43	34	88	794
Diphtheria		13	1	51	3	3	1		2	74
Dysentery (bacillary)				5						5
German measles				3	9		2	2	1	17
Influenza		32	13		2	7			15	69
Measles		8	1	76	74	31	119	16	46	371
Meningitis, meningococcus			1	4	3	2	1		2	13
Mumps		78	9	90	1,135	93	93	174	180	1,852
Poliomyelitis							1			1
Scarlet fever		5	13	139	116	9	15	36	31	364
Smallpox								1		1
Tuberculosis (all forms)	3	1	10	155	55	7		5	17	253
Typhoid and paratyphoid fever				6					1	7
Undulant fever					1					1
Whooping cough		6	2	123	123	49	1	43	27	374

CUBA

Habana—Communicable diseases—4 weeks ended February 6, 1943.—During the 4 weeks ended February 6, 1943, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	23		Scarlet fever	4	
Leprosy	1		Tetanus	6	6
Malaria	23		Tuberculosis	2	
Measles	4		Typhoid fever	36	4
Paratyphoid fever	1				

Provinces—Notifiable diseases—4 weeks ended January 30, 1943—During the 4 weeks ended January 30, 1943, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	1	1	5	11	1	11	30
Chickenpox		2			2	31	35
Diphtheria	1	24	7	1	1	2	36
Hookworm disease		5					5
Leprosy	1	1		2			4
Malaria	72	25	5	33	7	610	752
Measles		5				5	10
Poliomyelitis	1	1		1	2	3	8
Scarlet fever	1	3					4
Tuberculosis	14	34	12	41	7	42	150
Typhoid fever	9	49	7	31	7	16	119
Whooping cough				1		14	15
Yaws						1	1

[1] Includes the city of Habana

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Argentina—Cordoba Province.—During the months of October, November, and December, 1942, 3 cases of plague with 2 deaths were reported in Cordoba Province, Argentina.

Peru.—During the month of December 1942, plague was reported in Peru, by Departments, as follows: Ancash, 2 cases, 1 death; Libertad, 2 cases, 2 deaths; Lima, Lima City, 1 case and murine infection.

Smallpox

Argentina—Salta Province.—During the month of December 1942, 95 cases of smallpox with 33 deaths were reported in Salta Province, Argentina.

Spain.—During the week ended January 23, 1943, 9 cases of smallpox were reported in Spain.

Turkey—Istanbul.—During the month of December 1942, 122 cases of smallpox were reported in Istanbul, Turkey.

Union of South Africa.—For the months of September, October, and November, 1942, 362 cases of smallpox were reported in the Union of South Africa.

Typhus Fever

Germany.—For the months of October, November, and December, 1942, 643 cases of typhus fever were reported in Germany.

Hungary.—For the 2 weeks ended February 6, 1943, 21 cases of typhus fever were reported in Hungary.

Mexico—Mexico, D. F.—Information dated February 4, 1943, states that for the month of December 1942, 104 cases of typhus fever with 18 deaths were reported in Mexico, D. F., Mexico, and for the period January 1–23, 1943, 91 cases of typhus fever were reported. The disease is said to be confined principally to the poorer classes.

Morocco—Casablanca.—Typhus fever has been reported in Casablanca, Morocco, as follows: Week ended January 2, 1943, 8 cases; week ended January 9, 6 cases.

Rumania.—For the week ended January 23, 1943, 225 cases of typhus fever were reported in Rumania.

Slovakia.—Typhus fever has been reported in Slovakia as follows: Week ended January 16, 1943, 12 cases; week ended January 23, 1943, 3 cases.

Spain.—During the week ended January 23, 1943, 56 cases of typhus fever were reported in Spain, including 4 cases in Madrid.

Union of South Africa.—During the months of September, October, and November, 1942, 912 cases of typhus fever were reported in the Union of South Africa.

Yellow Fever

Colombia—Intendencia of Meta.—On January 12, 1943, 1 death from yellow fever was reported in Intendencia of Meta, Colombia.

Nigeria—Port Harcourt.—The suspected case of yellow fever in Port Harcourt, Nigeria, reported on page 294 of the PUBLIC HEALTH REPORTS of February 12, 1943, has not been confirmed.

MANUAL FOR THE MICROSCOPICAL DIAGNOSIS OF MALARIA [1]

A Review

Quoting from the foreword written by Dr. Marshall A. Barber, "This manual begins with a description of the morphology and life history of the parasites of the different species of malaria, a description which is clear and thorough and should be useful to both the beginner in the subject and to one who may wish a concise review. The author uses throughout the terminology recommended by the Subcommittee of the Health Organization of the League of Nations.

"The manual consists in a treatment of the microscopical diagnosis of malaria in man and describes thoroughly the technique of the thick and thin films, and not only guides to the straight road leading to a correct diagnosis but also points out the various pitfalls awaiting the unwary microscopist."

Of special value are the six color plates from water-color drawings. These show the appearance of the three common species of malaria in the thin film, as well as in the thick film. There are also six plates of microphotographs of malaria parasites and one which illustrates the procedure of making the thick blood film.

[1] National Institute of Health Bulletin No. 180, "Manual for the microscopical diagnosis of malaria," by Assistant Technologist Aimee Wilcox, U. S. Public Health Service. For sale by the Superintendent of Documents, Washington, D. C., price 30 cents.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

THE PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world, (2) articles relating to the cause, prevention, and control of disease, (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

10 Aug. 1943

Public Health Reports

VOLUME 58 MARCH 12, 1943 NUMBER 11

IN THIS ISSUE

Sewage Disposal—Recommendations of Committee

A Giemsa Stain from Eosin and Methylene Blue

CONTENTS

Public Health Reports

Vol. 58 • MARCH 12. 1943 • *No. 11*

RECOMMENDATIONS OF JOINT COMMITTEE ON RURAL SANITATION—RURAL SEWAGE DISPOSAL

December 1942

Federal and State agencies represented on the Joint Committee

United States Department of Agriculture.
- Bureau of Agricultural Chemistry and Engineering.
- Extension Service.
- Farm Security Administration
- Forest Service.
- Rural Electrification Administration
- Soil Conservation Service.

Conference of State Sanitary Engineers.
Federal Housing Administration.
Federal Security Agency:
- Office of Education.
- United States Public Health Service.

Tennessee Valley Authority

TABLE OF CONTENTS

FOREWORD

In June 1941, at the suggestion of various Government agencies interested in proper disposal of sewage and development of safe water supplies in rural areas, the Public Health Service held a meeting to consider appointment of a joint committee to study the problems involved and develop a set of uniform recommendations to be followed by the agencies concerned. At this meeting, held on June 17, 1941, the Joint Committee on Rural Sanitation was formed consisting of the following representatives: [1]

U. S. Department of Agriculture:
- Bureau of Agricultural Chemistry and Engineering:
  - S. H. McCrory, Assistant Chief.
- Extension Service:
  - S. P. Lyle, in Charge of Agricultural and Home Economics Section.
- Farm Security Administration:
  - D. W. Evans,[2] Senior Sanitary Engineer.
  - J. P. Slater,[3] Sanitary Engineer.
  - I. F. Shull,[4] Senior Sanitary Engineer.
- Forest Service:
  - Clifford A Betts, Engineer
- Rural Electrification Administration:
  - Harry Slattery, Administrator
  - F. J. Sette,[5] Deputy Administrator
  - J. R. Cobb,[6] Installations Loan Section
  - C. G. Kilbourne,[7] Senior Engineer, Washington, D. C, Liaison Office.
- Soil Conservation Service:
  - Hugh R. McCall, Construction Engineer.

Conference of State Sanitary Engineers:
- H. N. Old, Senior Sanitary Engineer, Secretary of Conference.

Federal Housing Administration:
- John B. Thomas, Sanitary Engineer.

Federal Security Agency:
- Office of Education:
  - Miss Alice Barrows, Specialist in School Buildings.
  - W. Gaumitz,[8] Senior Specialist in Rural Education Problems.
- Public Health Service:
  - J. K. Hoskins, Senior Sanitary Engineer.
  - F E DeMartini, Passed Assistant Sanitary Engineer.

Tennessee Valley Authority:
- W G. Stromquist, Principal Sanitary Engineer

[1] Titles as of date of appointment to Committee
[2] Committee member until April 1942
[3] Committee member until September 1941.
[4] Replaced D W Evans in April 1942
[5] Committee member until February 20, 1942
[6] Replaced F J Sette on February 20, 1942
[7] Replaced J. R Cobb in May 1942
[8] Replaced Miss Alice Barrows on September 9 1942

The following subcommittees and officers were appointed at the meeting of June 17, 1941:

Policy and Program—F. J. Sette, chairman.
Research—S. H. McCrory, chairman.
Rural Sewage Disposal Involving Water Carriage—J. B. Thomas, chairman.
Rural Sewage Disposal Without Water Carriage—D. W. Evans, chairman.
Chairman of Joint Committee—J. K. Hoskins
Secretary of Joint Committee—F. E. DeMartini.

A number of meetings of the Joint Committee and subcommittees were held in 1941 and 1942 in the development of the recommendations here proposed, in the first report of the Joint Committee, for rural sewage disposal.

The recommendations of the Committee are presented primarily to serve as a guide of satisfactory practice in this field for the governmental agencies represented in their development. In addition it is hoped that State and local health authorities, school boards, recreational agencies, and others interested in disposal of sewage in rural areas will make use of these principles and recommendations in the preparation of their detailed bulletins or codes on this subject.

The Committee believes it desirable to issue these recommendations with the proposal that revision of the material be made from time to time over a period of years on the basis of comments that may be received from interested agencies and of further developments in this field. It is hoped that by following this procedure a generally accepted manual may be developed which will be helpful in attaining uniformity and improvement in the field of rural sewage disposal.

INTRODUCTION

Of all factors influencing the health of individuals in rural and urban areas where public sewers are not available, no single item is of greater importance than the proper disposal of human excreta. Many diseases such as typhoid fever, dysentery, and various types of diarrhea are transmitted from one person to another through the fecal contamination of food and water, largely due to the improper disposal of human wastes. For this reason, every effort should be made to prevent such hazards and to dispose of all human excreta so that no opportunity will exist for fecal contamination of water or food.

Safe disposal of all human and domestic wastes is necessary to protect the health of the individual family and the community and to prevent the occurrence of nuisances. To accomplish satisfactory results, such wastes must be disposed of so that:

1. They will not contaminate any drinking water supply.
2. They will not give rise to a public health hazard by being accessible to insects, rodents, or other possible carriers which may come in contact with food or drinking water.
3. They will not give rise to a nuisance due to odor or unsightly appearance.
4. They will not pollute or contaminate the waters of any bathing beach, shellfish breeding ground, or stream used for public or domestic water supply purposes, or for recreational purposes.
5. They will not violate laws or regulations governing water pollution or sewage disposal.

The Committee has studied the various devices used for disposal of sewage in rural areas and presents its recommendations under the headings of water carriage and nonwater carriage methods. Under the first heading are included: The septic tank, subsurface disposal field, seepage pit, dry well, and cesspool. Under the second heading are: The earth pit privy, masonry vault privy, chemical toilet, pail or can type privy, and cremating latrine or incinerator privy.

Adequate inspection of all features of rural sewage disposal works discussed in these recommendations is presupposed. Plumbing, tile lines, septic tanks, etc., which are to be covered or buried underground, should of course be inspected before being covered so that corrections can be made if necessary.

War emergency.—These recommendations have been prepared to indicate the Committee's views on satisfactory practice. Reference has necessarily been made in various places to materials that should be used or those that are preferable. It is realized, however, that during the war emergency some of the materials specified may not be obtainable. Use of substitutes will therefore be necessary in such instances in accord with the program of conservation of critical materials for the direct war effort.

PART I

Water Carriage Sewage Disposal Methods

A water carriage system is a system of piping through which all sewage and domestic liquid wastes are conveyed by the flow of water from the point of origin in a place of human habitation to the point of disposal.

The most satisfactory and convenient method of disposing of sanitary wastes where running water is available is by a water carriage system. While this type of system allows an easy carriage of the wastes from the dwelling, the problem of final disposal is complicated by the large increase in bulk caused by the addition of water.

Experience has shown that the most efficient installation for the disposal of sewage from individual dwellings and public buildings located in rural areas where a public sewerage system cannot be made available is an adequate sized septic tank with properly designed field system for the disposal of the effluent. However, no individual design is applicable for universal adoption due to varying local conditions and types of soil encountered. Where only very restricted yard or lot areas are available, other complications often develop and in many instances seepage pits or a combination of subsurface disposal fields and seepage pits, or even cesspools with seepage pits, for effluent disposal must be designed to meet the conditions encountered. Tight clay soils also offer many perplexing problems regarding the safe and satisfactory disposal of the effluent from the various types of systems considered. These problems often become serious where a number of dwellings are contemplated on adjoining lots and where individual disposals are proposed for subdivision developments.

Where individual systems are proposed in subdivision areas which may eventually become congested areas, special care must be taken to assure the construction of the most satisfactory installation, bearing in mind the conditions which will exist when such areas are completely developed. Soil conditions must be carefully checked by percolation tests to determine the porosity of the soil. In all cases the systems must be designed in accordance with definite recommendations in order to prevent the development of saturated soil conditions which may eventually result in public health hazards.

The design of any individual sewage disposal system must take into consideration location with respect to wells or other sources of water supply, topography, soil conditions, area available, and maxi-

mum living capacity of the building served. Where soils are impervious and suitable unobstructed yard area is limited, consideration must be given to the construction of a public or community sewerage system rather than proceeding with the installation of individual systems which may prove unsatisfactory and become insanitary within a short period of time.

Individual septic tank systems should be considered a temporary means of sewage disposal when installed in subdivisions or large developments which are destined to become congested communities. In planning such developments consideration should be given to extension of and connection to a municipal sanitary sewerage system or to the installation of an approved type of community system and treatment plant.

PLUMBING SYSTEM

The plumbing system is a system of pipes including the water service line and building drainage lines from their several connections within the building to their connections with the public mains or individual water supply and sewage disposal systems, together with fixtures, traps, vents, and other devices connected thereto. Storm water drainage pipes may be considered a part of the plumbing system when connected to a public sewer system.

Building drain.—The building (house) drain is that part of the lowest horizontal piping of a building drainage system which receives the discharge from soil, waste, and other drainage pipes inside the walls of the building and conveys it to the building (house) sewer, which begins at a point approximately 5 feet outside the inner face of the building wall.

Good plumbing is essential to the proper functioning of the drainage system of any building or individual dwelling. Unless all fixtures are properly installed and connected, the sewage will not be carried from the building in a safe and sanitary manner. All fixtures must be properly trapped and vented to prevent odors from being discharged into the rooms of the building. Ground water, any foundation drainage, or rain water from roofs and areaways should not be discharged into the plumbing system, especially where the building is to be served by an individual sewage disposal system.

There should be no interconnections between the water distribution system and the drainage system regardless of how constructed or controlled and all plumbing installations should be made in such a manner as to prevent back flow. The Plumbing Manual, Report B. M. S. 66 of the National Bureau of Standards, United States Department of Commerce, is the recommended standard for plumbing installations. In the interest of conservation of metals, it is

recommended that during the emergency period the following standards be used as the plumbing guide: "Emergency Plumbing Standards for Defense Housing" (issued by the Division of Defense Housing Coordination, Office for Emergency Management), which is fundamentally in accord with Report B. M. S. 66.

GREASE INTERCEPTOR

A grease interceptor is a device in which the grease present in sewage is intercepted, congealed by cooling, and from which it may be skimmed from the surface of the liquid waste for disposal.

Function.—Grease interceptors are considered unnecessary on individual sewage disposal systems unless excessive amounts of grease are used within the building served. Some State departments of health require the installation of grease interceptors on individual systems serving dwellings, but this is not believed to be necessary as the ordinary kitchen wastes do not in most cases contain sufficient grease to justify such installations. Where large kitchens exist in public buildings such as lodge buildings, recreational centers, or restaurants, grease interceptors may be installed to prevent excessive accumulation of grease in the septic tank which may affect efficient operation.

Unless grease interceptors are properly located and inspected at intervals not exceeding 30 days, their purpose cannot be fully realized and they often become a nuisance. It is the consensus among sanitary engineers today that grease interceptors on sewage disposal systems serving individual dwellings need not be provided if a properly designed septic tank is installed having adequate capacity for sludge storage and accumulation of scum.

Location.—Grease interceptors, when used, should be placed at an accessible location for cleaning. Where efficient and regular cleaning is questionable it is desirable to install large interceptors and locate them outside the building adjacent to the building drain. Wherever such grease interceptors are constructed, care must be exercised to have the inlet and outlet properly trapped.

Design.—The design and capacity of grease interceptors will depend upon the type of building and the number of persons served. For a single family dwelling the interceptor capacity should be about 30 gallons. In instances where a variable load is encountered or only a daytime load is to be served allowances should be made accordingly.

The interceptors may be constructed of metal, brick, vitrified or concrete pipe, or concrete, and should be of sufficient depth to permit proper trapping of outlet to assure the retention of all grease. The

inlet and outlet should be placed as far apart as possible and the depth below the outlet flow line should be not less than 2 feet.

BUILDING SEWER

The building sewer is that part of the horizontal piping of a building drainage system extending from a point 5 feet outside the inner face of the foundation wall to the public sewer connection or individual sewage disposal unit (septic tank, cesspool, or other type of disposal).

The building sewer should be constructed of bell and spigot cast-iron pipe, vitrified clay, concrete, or other approved sewer pipe. Portland cement mortar or an approved bituminous compound should be used for all joints on pipe lines other than cast iron; lead or other approved joint material should be used on all cast-iron pipe lines. It is desirable in cases where the septic tank or primary unit of the disposal system is located within 25 feet of the building or dwelling to construct the building sewer of extra heavy cast-iron pipe throughout its entire length because cast-iron lines are less susceptible to clogging and easier to clean. Vitrified clay or concrete pipe should not be used in sizes less than 6 inches. When cast-iron pipe is used in the building sewer it may be the same diameter as that of the building drain, provided that it is not less than 4 inches in diameter. Whenever the building sewer is a different size than the building drain the connection therewith should be made with the proper type increasing fittings, assuring a watertight joint and satisfactory construction.

All joints on the building sewer should be made by using a ring of oakum (jute) and approved joint material to provide water tightness. Whenever the building sewer line is laid within 15 feet of large trees or dense shrubbery and constructed of material other than cast-iron pipe with lead-caulked joints the joints should be made with a bituminous compound or other root-proofing material. Special copper rings may be used with cement mortar or the cement mortar treated with copper sulfate or coarse salt to prevent roots penetrating the joints and entering the pipe line, eventually clogging the sewer.

The most essential features to be observed in construction of the building sewer line are listed as follows:

1. Minimum size of pipe:

 6 inches if sewer is of vitrified clay or concrete, 4 inches if sewer is of cast iron.

2. Minimum grade—1 percent (1 foot fall per 100 feet or ⅛ inch per foot). However a fall of ¼ inch per foot is preferable and should be provided wherever feasible.

3. Grade of building sewer for 10 feet immediately preceding the tank should not exceed 2 percent.

4. Cast-iron pipe with lead or other approved joint material used when within:

50 feet of a well or suction line from a well.
10 feet of any drinking water supply line under pressure.
5 feet of basement foundations, and when laid beneath driveways with less than 3 feet of earth cover.

5. Cleanout at every change in line in excess of 45° and at every change in grade in excess of 22½°. (Cleanouts are desirable within 5 feet of the septic tank where tanks are located more than 20 feet from the building. An economical cleanout may be provided by inserting a tee in the line with the vertical leg extending to ground level and plugged with a brass cap. If the line is deeper than 4 feet, manhole construction would be required for cleanout purposes.)

6. All joints made watertight and protected from damage by roots wherever necessary.

SEPTIC TANK

A septic tank is a sewage settling tank intended to retain the solids in immediate contact with the sewage flowing through the tank, for a sufficient period to secure satisfactory decomposition of settled solids by bacterial action.

Function.—The septic tank in conjunction with a subsurface disposal field is considered by the majority of engineers today to be the most satisfactory method of disposing of sewage from small installations, especially individual dwellings and isolated rural buildings where public sewers are not available. Contrary to general belief septic tanks should not be depended upon to remove disease-producing bacteria from sewage. The septic tank serves the purpose of separating the solids from the liquid, permitting the liquid to be more easily disposed of by filtration into the soil and the solid matter to be handled in the form of sludge. The fact that solids are retained in the tank requires that a tank of adequate size be provided in all cases, considering the maintenance the system may receive. Periodic maintenance must be provided to assure inspection and the removal of accumulated sludge at regular intervals if a reasonable length of service is to be expected.

Location.—The septic tank should be located where surface drainage from the site is away from all sources of water supply. The elevation of the tank should be such as to permit sufficient fall in the house sewer lines (minimum ⅛ inch per foot) and proper grading of all lateral lines in the disposal field, allowing all field lines to be constructed without excessive cover. The location should permit easy access for inspection and cleaning. Low swampy areas or areas which may be subject to flooding should be avoided.

Septic tanks constructed of material not subject to excessive corrosion or decay need not be restricted to any minimum distance from the building foundation. The tank site should be chosen so as to make the largest possible area available for the disposal field. A safe distance (such "safe distance" to be dependent upon the numerous local factors involved—preferably separation of at least 50 feet) should be maintained between this site and any sources of water supply. Caution should be taken to provide that surface drainage from the area around the tank site will not reach the vicinity of the water supply. The tank should be at a lower elevation than the source of water supply.

Where buildings have no basement fixtures or are constructed without basements the building drain should be held to an elevation which will permit the tank to be installed without excessive cover. Proposed finish grades about the building should also be checked in order that the tank will not be buried more than 12 to 18 inches. In cold climates the tank may be placed at a greater depth to prevent freezing if topography permits. Where additional earth cover is unavoidable the manholes on the tank should be extended to the ground surface.

Design features.—The size of the septic tank should be based on the average daily flow of sewage into it with a retention period of approximately 24 hours with due consideration to sludge storage. The minimum liquid capacity for any tank serving a dwelling should be 500 gallons and this capacity should be increased for dwellings having more than two bedrooms. Where tanks are used having more than one compartment the inlet compartment should always have a liquid capacity of at least 500 gallons. It should be realized that the capacity of a septic tank is reduced approximately 20 gallons per person per year by the accumulation of sludge. All tanks should be designed to allow the sewage to enter at one end, permit a slow uniform horizontal flow through the tank and discharge of settled sewage at the other end with the least possible disturbance of the tank contents. Tanks should be designed with a length not less than twice the width and with a minimum liquid depth of 4 feet. The liquid capacities of septic tanks should conform with tables 1 or 2. The tank capacities given in tables 1 and 2 are based on a sewage contribution of:

50 gallons per capita daily in dwellings.
25 gallons per capita daily in camps.
17 gallons per capita daily in day schools.

The liquid capacities in table 1 provide enough space for 2 years' accumulation of sludge and an additional volume equal to the sewage flow for 24 hours. However, the minimum size tank permitted is 500 gallons.

TABLE 1.—*Required capacities for septic tanks serving individual dwellings*

Number of bedrooms	Maximum number of persons served	Nominal liquid capacity of tank in gallons	Recommended dimensions				
			Width	Length	Liquid depth	Total depth	Total capacity in cubic feet
			Ft In	*Ft In*	*Ft In*	*Ft In*	
2 or less	4	500	3 0	6 0	4 0	5 0	90
3	6	600	3 0	7 0	4 0	5 0	105
4	8	750	3 6	7 6	4 0	5 0	130
5	10	900	3 6	8 6	4 0	5 0	150
6	12	1,100	4 0	8 6	4 6	5 6	190
7	14	1,200	4 0	9 0	4 6	5 6	200
8	16	1,500	4 6	10 0	4 6	5 6	250

NOTE.—Liquid capacity based on number of bedrooms in dwelling. Total volume in cubic feet includes air space above liquid level. Where two-compartment tanks are used the inlet compartment should have a liquid capacity of not less than 500 gallons.

The liquid capacities in table 2 are equal to a 24-hour sewage flow without allowance for sludge storage. The omission of allowance for sludge storage is due to the necessity that the best of care and maintenance be given septic tanks serving schools and camps, including cleaning at least annually, and to the lower per capita solids load in such tanks in comparison with those serving individual dwellings.

TABLE 2.—*Required capacities for septic tanks serving camps and day schools*

aximum number of persons served		Nominal liquid capacity of tank in gallons	Recommended dimensions				
amps	Day schools		Width	Length	Liquid depth	Total depth	Total capacity in cubic feet
			Ft In	*Ft In*	*Ft In.*	*Ft In*	
40	60	1,000	4 0	8 6	4 0	5 0	170
80	120	2,000	5 0	11 0	5 0	6 3	345
120	180	3,000	6 0	13 6	5 0	6 3	505
160	240	4,000	6 0	18 0	5 0	6 3	675
200	300	5,000	7 6	18 0	5 0	6 6	880
240	360	6,000	8 0	20 0	5 0	6 6	1,040
280	420	7,000	8 6	20 0	5 6	7 0	1,190
320	480	8,000	8 6	23 0	5 6	7 0	1,370

NOTE.—Total volume in cubic feet includes air space above liquid level. Tanks with capacities in excess of 8,000 gallons should be designed for the specific requirements involved; however, in such cases the necessity of a more complete type of treatment should receive consideration.

Experience seems to indicate little need for a multiplicity of partitions, baffle walls, or connecting pipes from various chambers. Such construction adds to cost and often reduces the efficiency of the tank by decreasing sludge storage capacity in the inlet compartment and increasing the velocity of flow through the tank which interferes with sedimentation. Small tanks used for individual residence installations have been found to operate most efficiently with single sub-

merged inlet and outlet connections or single baffle walls at the inlet and outlet ends. Inlet baffles should extend 12 inches and outlet baffles 15 to 18 inches below the liquid level and they should project not less than 6 inches above the flow line. The submerged connections should be constructed with cast-iron pipe, using a sanitary tee and a short section of pipe to provide an inlet to proper depth. The cross-sectional area of the submerged inlet pipe should always be the same as that of the inlet sewer line. The outlet should be of similar construction. Where baffles are used in lieu of the submerged inlet and outlet they may be of concrete or wood construction, but should be placed approximately 12 inches from the inlet and outlet ends of the tank. The invert of the inlet should be at an elevation 3 inches above the invert of the outlet.

The septic tank cover or slab should be designed for a dead load of not less than 150 pounds per square foot. When constructed of concrete the slab should be reinforced and at least 4 inches thick. The tank slab should provide a watertight cover for the tank and where constructed in one piece or monolithically with the tank should have at least one manhole. Sectional slab covers may also be used but this type of cover may prove unsatisfactory as difficulty is encountered in obtaining a watertight seal if the cover is once removed for maintenance permitting surface drainage or ground water to seep into the system. All large tanks should have two manholes when provided with a solid slab cover. When only one manhole is provided it should be located above the inlet; where two manholes are provided they should be placed over the inlet and outlet of the tank and each manhole should be at least 20 inches square. Circular manhole openings, when provided, should be at least 24 inches in diameter. Properly designed covers which can be sealed watertight should be provided for all manhole openings.

A sludge drain may be provided in the septic tank whenever the installation is in a rural area and located where it may be possible to drain the tank on adjacent land rather than cleaning by pumping. Either a plug or valve may be used on the sludge drain.

Dosing chamber with automatic siphon.—Dosing chambers with automatic siphons are not generally recommended on septic tank installations serving individual dwellings. Periodical dosing of the disposal field is desirable in most instances but the additional cost of automatic siphons is not considered justifiable on the small dwelling installations. Siphons should be provided on large septic tank installations (1,000 gallons and above), especially those using sand filter trenches or open sand filter beds for the disposal of effluent and for installations serving schools and camps. Whenever a siphon is

installed the liquid capacity of the dosing chamber should be sufficient to fill all field lines from ½ to ¾ full at each discharge, but discharges should not occur more frequently than at 2- to 3-hour intervals.

Operation and maintenance.—Maintenance of any septic tank will depend largely on the daily flow of sewage and the number of persons served. With ordinary use and care, cleaning of the average septic tank should be necessary only every two to three years provided the tank has been properly designed with adequate sludge storage space. However, the tank should be inspected every 12 to 18 months, and the depth of accumulated sludge checked. When the scum accumulations and the sludge deposits reach a combined depth of 18 to 20 inches the tank should be cleaned. Sludge should be removed in the spring rather than in the fall to avoid loading the tank with undigested solids during the cold weather months. The sludge may contain disease-bearing bacteria, hence the disposal of sludge should be accomplished by burial or other methods satisfactory to the State health department. Excessive amounts of foreign substances should not be permitted to enter the tank. By proper construction of the tank and all connecting lines, rain water, surface drainage, and foundation drainage should be prevented from entering the tank.

It is recommended in all individual dwelling installations that a chart be provided and placed at a suitable location in the dwelling showing the location of the tank and the field system. This chart should also contain brief instructions as to the inspection and maintenance required. Such a chart should assist in acquainting home owners of the necessary maintenance septic tanks require and forestall many of the failures by assuring satisfactory operation.

FIELD DISTRIBUTING BOX

A distributing box is a box or chamber into which the septic tank effluent discharges and from which the sewage enters the subsurface absorption lines, permitting regulation of flow into these lines and inspection of the quality of the septic tank effluent.

Function.—For the efficient operation of a disposal field, drain tile should be fed through a distributing box which permits regulation and equalization of flow in all lines. A distribution box also serves the purpose of an inspection manhole for checking the quality of effluent.

Location.—The distributing box should be connected to the septic tank by a short tight sewer line and located at the upper end of the distribution field (subsurface disposal field).

Design.—The inlet pipe should enter at one end of the box about 2 inches above the bottom. Sides of the box should extend to within

6 inches of the surface and the box should be provided with a removable cover. Drain lines should be constructed with inverts at bottom level of the box and all set at the same elevation. They should take off straight in the desired direction. Horizontal bends should be avoided where possible, but when necessary they should be made with tight joints. When set at the same elevation and operating under the same head, all pipes of the same size are more likely to receive an equal quantity of flow.

The size of the box need not be more than 18 inches in width, nor longer than is necessary to accommodate drains for effective outlet capacity. Diversion baffle boards should not be installed in distribution boxes on systems serving individual dwellings. However, such construction may prove advisable on systems serving public buildings where constant supervision and maintenance is provided and where the purpose of such baffle boards may be realized. Drains may be shut off at will for repairs or to rest the field when it becomes waterlogged, provided a distribution box is installed. Flow diversion devices may be installed in the distribution box to facilitate rotation of use of the distribution lines where adequate and proper maintenance is assured.

SUBSURFACE DISPOSAL FIELD

A subsurface disposal system is an open-jointed system of pipes or drains through which sewage effluent is distributed beneath the surface of the ground for absorption into the soil

Function.—Every disposal system should be designed to dispose adequately of all liquid waste discharged into it. This will be controlled chiefly by the actual soil absorption and evaporation. Where the surface stratum is definitely impervious, a modified design of the system should be considered, using seepage pits or sand filter trenches in order to secure adequate effective absorption area and provide for the discharge of effluent without causing a health hazard or nuisance. Sand filter trenches should be used only in cases of unusual soil conditions and then the installation should be approved by the State department of health.

Location.—Disposal fields should be at least 100 feet from any water supply well, 25 feet from any stream, and 10 feet from dwellings or property lines. A minimum distance of 50 feet from drilled wells is permissible when the casing extends watertight to a depth of 50 feet or more.

Details pertaining to water wells such as depth, type of construction, vertical zone of pollution, etc., together with the geological formations and porosity of subsoil strata must be considered in determining the safe allowable distance between wells and disposal fields.

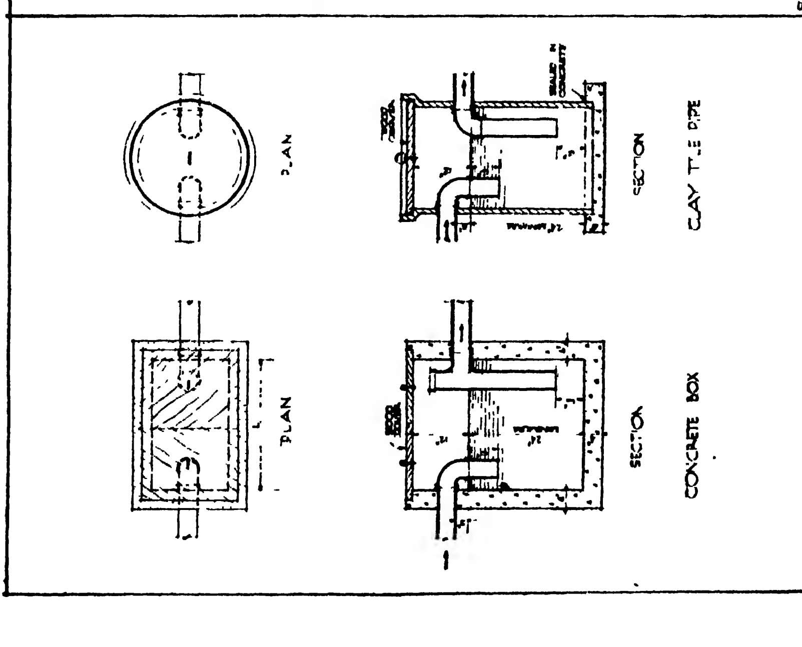


FIGURE 1.—Grease interceptors

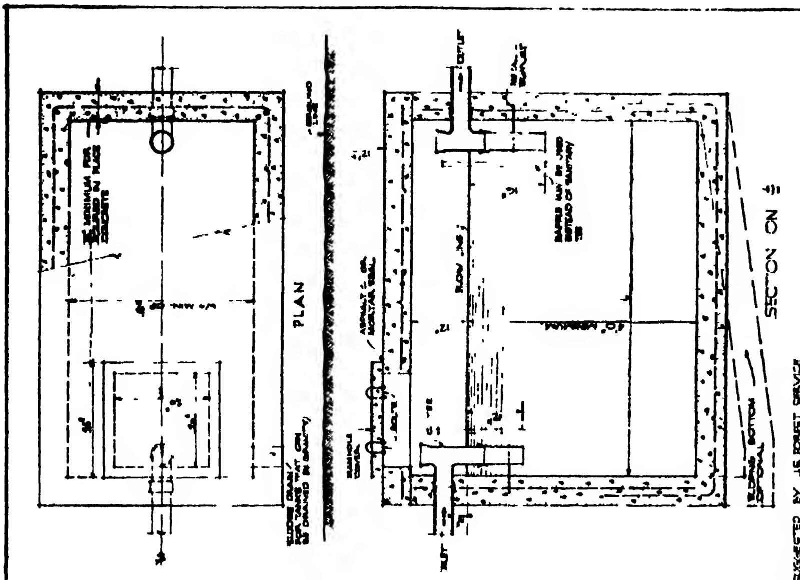


FIGURE 2.—Single chamber septic tank

510831°—43 -3

Design features of disposal field.—A distribution box is considered essential in every field system and at least two lateral lines should be constructed from every distribution box and when necessary sufficient additional laterals should be installed to provide the required trench area. The installation of the distribution box will provide means whereby the design of the system can be varied to meet most topographical conditions encountered. Such design will permit proper grade and alignment for all laterals.

The disposal field should be designed to provide proper distribution of the effluent throughout the field. By proper design of the field system trouble from overloading of single lines, with resultant bleeding of effluent to the ground surface, may be avoided.

Accepted practice in the design of disposal field systems has been to base all calculations on footage of tile per person served, using a general classification of the soils encountered. It is doubtful whether this method achieves the desired results. Since the actual absorptive quality of the soil and the flat area made available in the bottom of the trenches are the controlling factors, it appears more practical to base the design on these factors and on the maximum living capacity of the dwelling or building served.

The porosity of the soil should be determined by percolation tests; however, where such tests are impractical the experience data available from the health authority having jurisdiction may be sufficient. With dwelling installations all calculations should be based on a daily flow of 100 gallons of sewage per bedroom. In cases involving public buildings or recreational buildings having a daytime usage only, the daily load should be based on the estimated average usage Actual experience will govern a safe estimate of usages in this case as it may vary from 30 to 60 gallons per person per day. This information, with data in table 3, should provide sufficient data for determining the absorption area (flat area in the bottom of the trench) necessary in the disposal system laterals.

Tile, 4 inches in diameter, is recommended as most desirable for the field laterals. Bell and spigot vitrified clay pipe has been found practical for use in the field laterals when constructed in unprotected rural areas subject to traffic and is preferable where the additional expense can be met. Although this pipe is more expensive than agricultural drain tile, its use may often prove advantageous as this pipe is not easily crushed and the bells provide better means for maintaining a true line and grade. Bell and spigot pipe should be used only in 2-foot lengths and should be laid with ½-inch open joints constructed with sufficient cement mortar at the bottom of the joint to assure an even flow line.

Open joints of ¼ inch to ½ inch should be provided between agricultural tile sections, and the upper half of the joint should be covered with a strip of asphalt-treated paper. The paper strips should be large enough to be readily held in place while the tile is being covered. Covering of the joints on the bell and spigot pipe is not necessary, as the bell surface provides sufficient cover for the open joint.

All lines in the field should be separated by at least three times the width of the trenches with a minimum spacing of 6 feet. A greater spacing is desirable where available area permits. It is desirable that all laterals be of equal length to provide even distribution of the effluent. Under no condition should a field with less than 150 square feet of effective absorption area (100 linear feet of 18-inch trench) be provided for any individual dwelling unit. Maximum length of the lines should not exceed 100 feet and at least two lines of tile should be provided.

The grade of the field lateral lines may vary from 2 inches to 4 inches per 100 feet, but should never exceed 6 inches per 100 feet (.5 percent grade). It is desirable to have the tile lines within 18 inches of the finished grade but in many instances, due to topography, the depth of cover must be varied in order to maintain an even grade. The total depth of the lateral trenches should average not more than 36 inches. Where it may be necessary to construct a large percentage of the field lines with cover in excess of 30 inches other designs using seepage pits should be considered.

Method of making percolation test.—1. Excavate a hole 1 foot square and to the depth of the proposed disposal trenches. This depth in most instances will be approximately 24 inches and should not exceed 36 inches.

2. Fill the hole with water to a depth of at least 6 inches, and allow this water to seep away. Judgment is required in determining how soil conditions at time of test vary from year-round average conditions. Where soil appears exceptionally dry, or where soil conditions are questionable, greater depths of water may be used or the test may be repeated. In no case shall tests be made in filled or frozen ground. Where fissured soil formations are encountered, tests should be made only as directed by and under the supervision of a representative of the State health department.

3. Observe the time in minutes required for the water to seep away completely. This time divided by the total number of inches of water placed in the hole gives the average time required for the water to drop 1 inch. With this information, the effective absorption area required for each individual system may be determined from table 3.

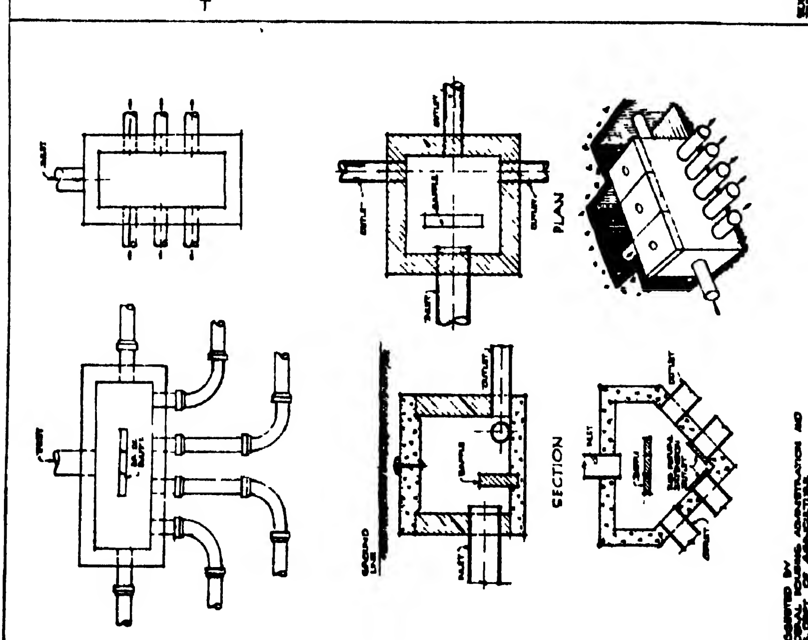


FIGURE 3.—Distribution boxes.

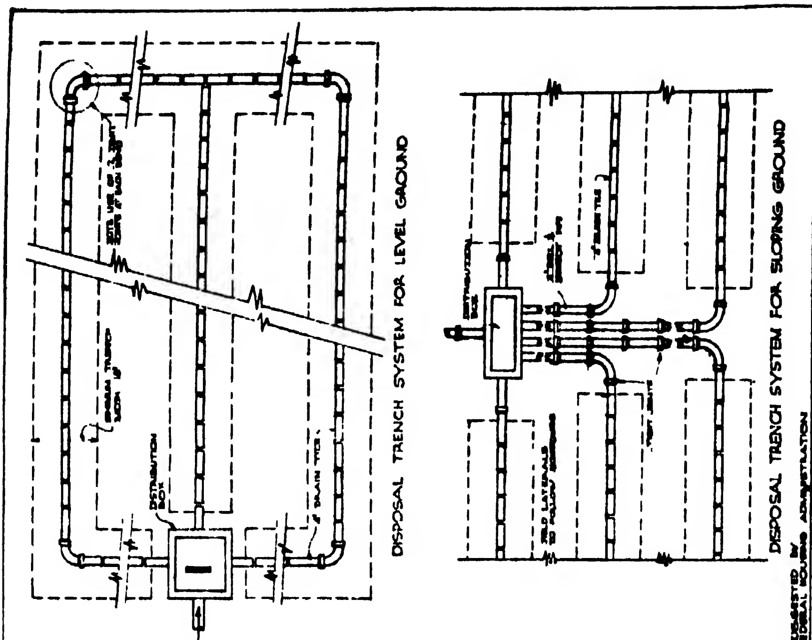


FIGURE 4.—Subsurface disposal fields

TABLE 3.—*Data for determining field requirements from percolation tests*

Time required for water to fall 1 inch (in minutes)	Effective absorption area required in bottom of disposal trenches in square feet		
	Residences (per bedroom)	Camps (per person)	Schools (per person)
2 or less	52	13	9
3	60	15	10
4	72	18	12
5	80	20	13
10	105	24	18
15	120	32	21
30	180	45	30
60	240	60	40
Over 60	Special design using seepage pits or sand filter trenches		

NOTE.—A minimum of 150 square feet should be provided for each individual family dwelling unit.

DISPOSAL TRENCH CONSTRUCTION

Improper trench design and construction is in many instances the cause of the failure of the disposal system. Disposal trenches should be designed on the basis of the required effective percolation area. More direct attention should be given to the trench excavation and the specified width obtained at the bottom of the trench which is the area available for absorption.

The depth of the filter material beneath the tile may be varied, depending on the width and depth of the trenches; the filter material should be placed over the full width of the trench and should be not less than 6 inches deep beneath the bottom of the tile. Table 4 gives data on trench design and spacing for various conditions, together with requirements for general design. Agricultural drain tile should be laid on a grade board to assure proper grading. Grade boards are not necessary where bell and spigot pipe is used. Sufficient filter material should be placed around and over it to hold it in place and completely cover the tile to a depth of 2 inches.

TABLE 4.—*Size and minimum spacing requirements for disposal trenches*

Width of trench at bottom in inches	Depth of trench in inches	Effective absorption area in square feet per linear foot	Spacing of tile lines in feet [1]
18	18 to 30	1.5	6.0
24	18 to 30	2.0	6.0
30	18 to 36	2.5	7.5
36	24 to 36	3.0	9.0

[1] A greater spacing is desirable where available area permits.

The filter material may be washed gravel, crushed shell or stone, slag, rock spalls, or clean run of bank gravel. Such material may range in size from ¾ inch to 2½ inches. Cinder may be used if suffi-

cient coarse material is available. Where fine material must be used sufficient coarse material should be provided to protect the joints and prevent the fine material from being carried into the tile lines. Coarse material of uniform size larger than 2½ inches may be used at the bottom of the trenches.

A piece of untreated building paper or a 2-inch layer of straw should be placed over the filter material of all disposal trenches as the laying of the tile is completed, and before any earth backfill is placed. This will protect the filter material until the backfill settles. Where sloping areas are used for the disposal field it is desirable to construct an earth berm around the upper section of the field to divert surface drainage.

Sand filter trenches.—In tight, impervious soils sand filter trenches offer a means of disposal for septic tank effluent, provided a satisfactory and approved disposal point is available to receive the filter effluent. The sand filter trench is constructed by laying two lines of tile, one below the other, in a trench or series of trenches with an artificial filtering medium between the upper and lower lines of tile. A good filtering medium is coarse sand or coarse sand with not more than 10 to 15 percent of pea gravel. The septic tank effluent is distributed by the upper line of tile and filters through the sand. It is collected in the lower line of tile from which it may be discharged into a seepage pit or to an approved disposal point. When effluent is to be discharged into open ditches or water courses, approval of the State health department should be obtained. Figure 5 illustrates the details of construction for sand filter trenches.

SEEPAGE PIT

A seepage pit is a covered pit with open-jointed lining through which septic tank effluent or laundry wastes may seep or leach into the surrounding porous soil.

Function.—The function of seepage pits is primarily to facilitate the disposal of liquid wastes making them supplemental (or in some cases alternative) to tile drains, which are laid in specially constructed trenches, for the handling of effluent from a septic tank or laundry wastes.

Location.—Seepage pits, when used as supplemental to a subsurface tile field, should be located at minimum distances of 100 feet from any source of water supply, 20 feet from buildings, and 10 feet from lot lines. They should also be located at least 20 feet from disposal fields unless they are a part of the field as at ends of tile lines, and at least three times their diameter from each other. Seepage pits should never be used where there is a likelihood of contaminating underground waters, nor where adequate subsurface tile disposal fields can be provided. When seepage pits are to be used in place of a subsurface

tile field the same limitations with respect to location should apply as for cesspools, in addition to the above requirements.

Pit excavations should not extend into the ground water table. Where ground water is encountered, at least 2 feet of clean coarse sand and gravel (run-of-bank) should be placed in the bottom of the pit, raising the elevation of the bottom at least 2 feet above the maximum water table and providing a firm foundation for the lining.

Construction.—In the construction of a seepage pit provision of a hole 3 feet or more in diameter through at least 6 feet of porous soil is recommended. It should be lined with stone, brick, or concrete blocks laid up dry with open joints that are backed up with at least 3 inches of clean, coarse, bank run gravel to the elevation of the inlet. Above the inlet level the joints should be sealed with cement mortar.

It is customary to draw in the upper section of the lining, thereby reducing the size of the cover required over the top. A reinforced concrete slab should be provided on all pits and should be located 1 to 2 feet below the surface or finished grade. Where slab covers in excess of 30 inches square must be constructed there should be a manhole approximately 20 inches square provided therein. All removable slabs or manhole covers should be sealed in place so as to be watertight. Coarse gravel at least 1 foot deep should be placed in the bottom of the pit before the lining is installed. Gravel may also be used under the lining to stabilize the foundation if necessary. Tight jointed sewer pipe should be used for making connections to the pit. When conditions require that seepage pits be located in close proximity to trees they may be constructed without lining. In such cases the entire pit should be filled with loose rock. This type of construction will provide means whereby roots may enter the pit without damaging it. Tree roots often assist and prove advantageous in the disposal of effluent.

Capacity.—It is desirable that the liquid capacity of a seepage pit should be at least that of the septic tank. Where comparatively impervious soils are encountered the pit capacity should be twice that of the septic tank. Sufficient wall area should be provided to permit the liquid wastes to leach into the soil without overflowing. The wall area may be expressed in the design of the pit as effective absorptive area. The depth and coarseness of the porous formation and the depth of ground water are among the factors influencing the design of a seepage pit. Because these factors cannot always be accurately ascertained only an approximate determination can be made of the effective leaching area. This is generally done by making percolation tests in the porous strata as they are encountered in excavating the pit. Water poured into the hole until it is full should drain out in 24 hours.

Table 5 should be used for guidance in the general design of seepage pits. This table is based on number of bedrooms in the dwelling

assuming two persons per bedroom, regardless of size, and on the number of persons served in the case of camps and schools. In applying this table it should be remembered that pit capacity should be not less than that of the septic tank, as mentioned above.

TABLE 5.—*Requirements for seepage pit design*

Character of soil	Effective absorption area required (square feet)		
	Residences (per bedroom)	Camps (per person)	Schools (per person)
Coarse sand or gravel	20	5	3
Fine sand	30	8	5
Sandy loam or sandy clay	50	13	8
Clay with considerable sand or gravel	80	20	13
Clay with small amount of gravel or sand	160	40	27
Heavy tight clay, hardpan, rock, or other impervious formations	(1)	(1)	(1)

[1] Unsuitable

NOTE.—In calculating absorptive wall area of pit, gross diameter of pit excavation should be used.

DRY WELL

A dry well is a covered pit with open-jointed lining through which drainage from roofs, basement floors, or areaways may seep or leach into the surrounding porous soil.

Although drainage from roofs, areaways, and basement floors is not a sewage waste, a discussion of the method of its disposal by using dry wells is believed advisable to discourage its disposal with the sanitary sewage.

Function.—Dry wells are intended to provide means for soil absorption of drainage from basement floors and areaways and occasionally roof drainage, thereby eliminating these nonsewage wastes from the septic tank and subsurface drainage system. They should never be used for the disposal of sanitary sewage, septic tank effluent, or laundry wastes.

Location.—Dry wells should be located at least 50 feet from any source of water supply and 20 feet from any disposal field, cesspool, or seepage pit, and at least 10 feet from the building foundation.

Construction.—Dry wells may be considered in two classes—small pits serving individual drains and large pits receiving roof drainage from an entire building. Where a single pit is provided to serve a basement drain or areaway drain it may be constructed by using a 3-foot length of 15- or 18-inch diameter vitrified clay or cement pipe, provided a reasonably coarse foundation is encountered at the 3-foot depth. This tile is filled with coarse gravel or crushed stone thus providing sufficient voids to receive a quantity of water before overflowing, and permitting the water to leach out of the bottom into the soil.

The large dry wells are similar in size and construction to seepage pits; however, in many instances the pits are not curbed but entirely filled with very coarse gravel or crushed stone. Where it is not practicable to use one pit for all downspouts, individual pits may be provided for each downspout. The pits should be of ample size for the amount of water they may receive at any single period. The dry wells should have a solid concrete slab cover and be constructed so as to prevent the entrance of surface drainage from the surrounding soil. Dry wells should not be provided for roof drainage where surface discharge is feasible.

CESSPOOL

A cesspool is a covered pit with open-jointed lining into which raw sewage is discharged, the liquid portion of which is disposed of by seepage or leaching into the surrounding porous soil, the solids or sludge being retained in the pit.

Function.—A cesspool is not recommended as a substitute for a septic tank, as the raw sewage discharged into the cesspool tends to seal the openings in the lining and porous formation thereby reducing the leaching area and often causing the cesspool to overflow.

Cesspools are considered dangerous and often present a definite health hazard when excavated to excessive depth and into water-bearing formations. Their use should be permitted only where septic tanks are impractical and the possibility of contaminating any ground water supply is extremely remote. Many States have regulations prohibiting the installation of cesspools.

Location.—"Cesspools should be located at least 150 feet from wells, 15 feet from seepage pits and property lines, and 20 feet from dwelling foundations. They should never be used in the vicinity of shallow wells, and in any case only where approved by the State health department."

Construction.— In the construction of a cesspool a hole 3 feet or more in diameter and of sufficient depth to encounter a porous formation should be provided. Open-joint curbing should be used in a similar manner to the curbing of seepage pits and a slab cover with a manhole opening should be provided to permit access. All cesspools should be constructed with an overflow to a properly designed and constructed seepage pit. The overflow pipe to the seepage pit should have a submerged connection and the elevation of this overflow should be at least 6 inches lower than the elevation of the inlet.

Abandoned wells, drill holes, or abandoned mines should never be used either as cesspools or seepage pits for sewage disposal.

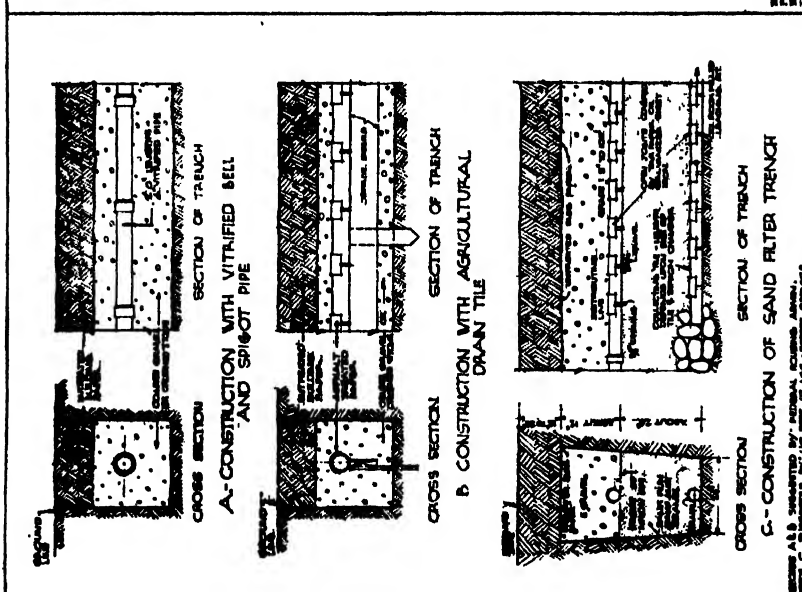


FIGURE 5.—Subsurface disposal trenches and sand filter trench

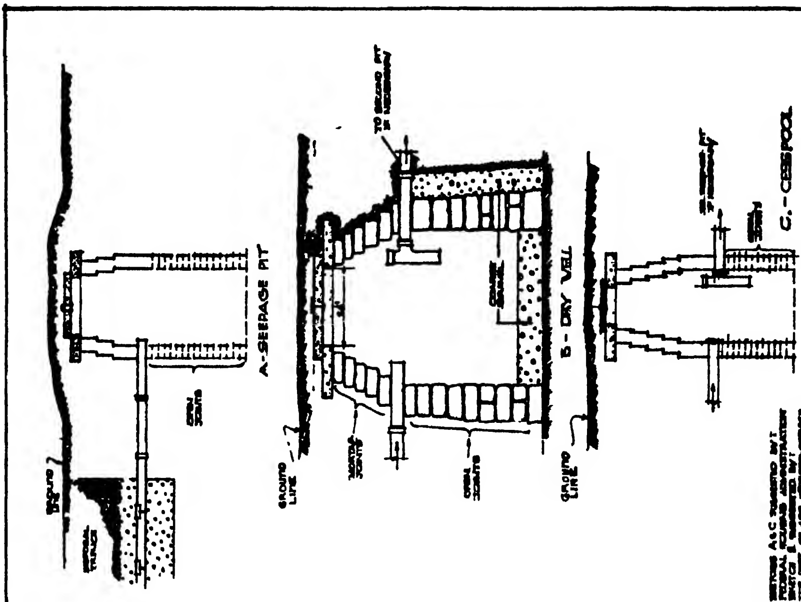


FIGURE 6.—(A) Seepage pit, (B) dry well, (C) cesspool.

PART II

Nonwater Carriage Sewage Disposal Methods

EARTH PIT PRIVY

An earth pit privy is a device for the disposal of human excreta in a pit in the earth. The pit is covered by a structure affording privacy and shelter and containing a seat with an opening into the pit.

Function.—The earth pit privy offers the most suitable type of excreta disposal unit for the individual rural home and in recreational areas where water carriage systems of disposal cannot be provided. In 1940, 114,000 of the 200,000 rural school buildings in the United States were of the one-room type and served by nonwater carriage sewage disposal units. While there are many different designs in use, the basic elements are the same in all cases.

The earth pit should be of such capacity that it may be used for several years without requiring the privy to be moved. Excreta and toilet paper are deposited directly into the pit. Aerobic bacteria break down the complex organic matter into more or less inert material. Insects, animals, and surface water are excluded from access to the pit to prevent the spread of intestinal diseases. It is essential that the privy be designed and constructed so that the pit can be maintained flytight.

Location.—The location of the privy should be such as to minimize danger of contamination of water supplies. Under ordinary conditions the privy should be located at least 50 feet from any well, spring, or other source of water supply. On sloping ground it should be located at a lower elevation than the water supply. On level ground the area around both privy and water supply should be mounded with earth. If any doubt exists as to the safety of the water supply if an earth pit privy is used, other types of disposal should be considered.

The site should be accessible to the user, ordinarily not less than 50 feet nor more than 150 feet from the buildings served. Consideration should be given to the direction of prevailing winds to reduce fly and odor nuisances. The privy pit should not encroach within 6 feet of any building line or fence to allow proper construction and maintenance.

Pit, sill, and mound.—A minimum capacity of 50 cubic feet for the average family is recommended. This pit should be tightly

sheathed for several feet below the earth surface, but openings in the sheathing are desirable below this depth. The sheathing should extend from 1 to 2 inches above the natural ground surface to provide space between the sill and the upper portion of the sheathing in order that the floor and building will not rest on the sheathings. A reinforced concrete sill should be provided for support of the floor and superstructure. This sill should be placed on firm undisturbed earth.

An earth mound at least equal in thickness to the concrete sill should be constructed, with a level area of 18 inches away from the sill in all directions.

Floor and riser.—Impervious materials such as concrete are believed to be most suitable for floor and riser. Because privy units are commonly used as urinals, the use of impervious materials for risers is desirable in the interest of cleanliness. In cold climates, wood treated with a preservative such as creosote has been found to be durable and to reduce the problem of condensation. Therefore, in some sections of the country wood may be used if approved by the State department of health.

Seat and lid.—Both seat and lid should be hinged to permit raising. Material used in construction should be light in weight but durable. Seats should be comfortable. Lids need not necessarily be self-closing. Separate seats with smaller openings for small children are preferable to a separate smaller riser unit. Such extra seats need not be attached to the unit but may be placed on top of the standard seat. Two objections to self-closing seat lids are the discomfort to the user in having the lid rest on the upper portion of the back and the contact of the oftentimes soiled or frost-covered bottom surface of the lid with the user's clothing. A seat lid has been devised to overcome these objections. (See fig. 9.) This lid is raised to a vertical position by lifting it from the rear end so that the top surface of the lid faces the user rather than the bottom surface which is normally exposed to the pit.

With hinged seat and lid and impervious riser construction there should be little need for urinal troughs. Such troughs in most instances are not constructed so that they can be maintained water-tight, thus permitting very undesirable and insanitary conditions to develop within the building. Where proper trough construction is provided the connection to the pit often permits all gases to be vented through the building. It is therefore recommended that the riser and seat construction be so installed as to make the use of urinal troughs unnecessary.

Vent.—Venting practices differ in many parts of the United States because of differences in climatic conditions. In some States, particularly those in the South, vents have been omitted entirely and results

from this practice appear to be satisfactory. Vents may pass vertically from either the pit or the riser through the roof or directly through the wall near the floor; the vertical vent from pit or riser may lead to a horizontal vent passing through both side walls or diagonally across a corner of the building. In all cases vents are screened. Galvanized steel wire screen dipped in paint, copper screens, and bronze screens are used. Nearly all designs employ a screen with 16 meshes to the inch. Hardware cloth is used to cover the outside entrance to vents to prevent entrance of large objects which would clog the vent.

It is stated by some authorities that venting serves no useful purpose and that vents should be eliminated from earth pit privies. The Committee believes that satisfactory recommendations with respect to vents can be made only after certain technical problems have been solved. The most important of these is the moisture condensation problem due to the temperature difference between the pit and the superstructure. The use of a cold wall to condense moisture within the pit has been suggested. In view of the uncertain value of venting no recommendations are offered in this report. Further research and study are indicated.

Superstructure.—Privy structures are standardized to some extent. The majority are 4 by 4 feet in plan, with a height in front of 6 feet 6 inches and at the rear of 5 feet 6 inches. Roofs with a 1 to 4 slope are commonly used. Variations provide a floor plan 4 feet wide and 5 feet deep, and 5 feet wide and 4 feet deep. The building should be constructed of substantial material, painted for resistance to weather, and fastened solidly to the floor slab. Proper roof overhang should be provided to dispatch rain water from the roof away from the mound. The roof should be constructed of watertight materials. Wood, composition shingles, or metal are suitable. Ventilation of the building by omitting siding beneath the roof is common except in cold climates. Here the siding is usually perforated with holes. Windows are sometimes used in the northern latitudes. Provision of coat hooks is also desirable.

MASONRY VAULT PRIVY

A masonry vault privy is essentially a pit privy in which the pit is lined with impervious material and in which provision is made for the removal of excreta.

Function.—Masonry vaults find their use chiefly where the ground water table is close to the ground surface or where it is necessary to prevent contamination of nearby water courses, wells, and springs. They are also used to some extent in limestone formations to prevent contamination of the water streams which occur in the solution channels of the limestone.

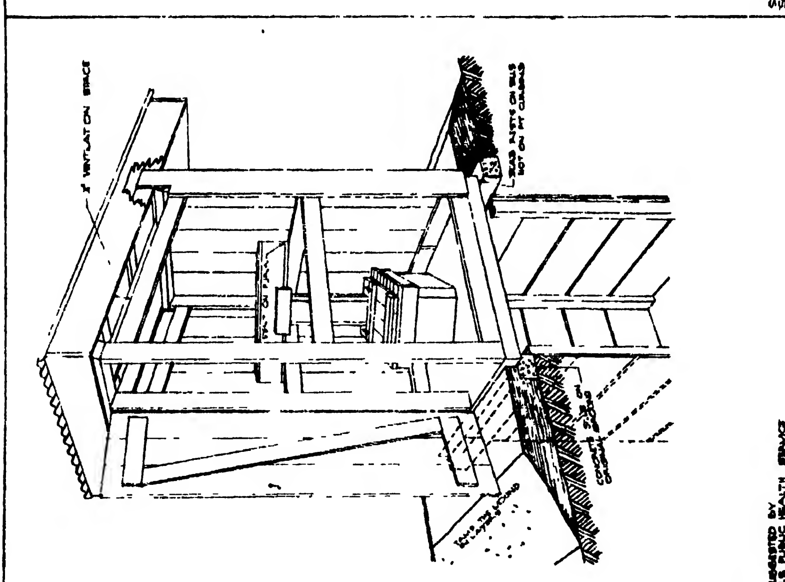


FIGURE 7.—Sanitary pit privy

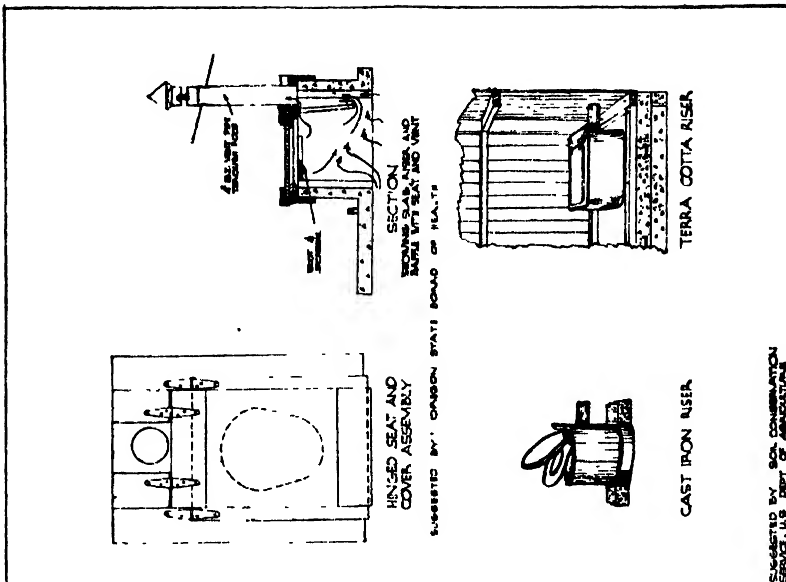


FIGURE 8.—Types of risers, vents, and seat assemblies.

The safety factors expected through the use of this type of privy are seldom achieved in actual practice. The leakage which generally occurs affects the safety features. Vaults are seldom built large enough and consequently frequent cleaning of vaults is necessary.

Construction.—Masonry vaults may be constructed of brick, stone, or concrete, although the latter is preferred. Vaults must be watertight to keep out ground water and prevent leakage of the vault contents. A readily accessible clean-out door is necessary. This door must be constructed to prevent access of flies, animals, and surface water to the vault contents. The floor of the superstructure, which forms a partial covering for the vault, must be impervious and concrete is recommended.

Cleaning.—Cleaning of vaults is usually done by scavengers who pump or dip the wastes from the vault. Even with careful manipulation, spillage occurs, especially about the clean-out door. Vault contents must be either buried or disposed of in a public sewer system. Again maintenance and supervision are large factors in the successful use of this type of disposal. The same type of superstructure, seat, riser, floor, and vent are used for masonry vault privy as for earth pit privy.

This type of disposal unit is satisfactory where it is essential that pollution of nearby water sources be prevented and where adequate maintenance and servicing are assured.

CHEMICAL TOILET

There are generally two types of chemical toilets: (*a*) commode type in which a pail containing a chemical solution is placed immediately beneath the seat; (*b*) the tank type in which a metal tank which holds the chemical solution is placed in the ground directly beneath the seat. A pipe or conduit connects the riser with the tank. Tanks are usually cleaned by draining to a subsurface seepage pit. Chemical toilets differ from privies in that they are commonly placed inside the dwelling, whereas privies are generally located apart from the dwelling.

Function.—Toilets of this type are usually predominant in cold climates where it is found desirable to have toilet facilities in or near the home and where running water is not available for flush toilets. The commode type is particularly common in recreational areas, at individual homes, and where there is sickness or an invalid in the family. The tank type is more often used in recreational areas or schools.

Chemicals.—Sodium hydroxide is commonly used to prepare the caustic solution used in commode or tank types of chemical toilets. The chemical is dissolved in water and placed in the receptacle. The

purpose of the chemical solution is to emulsify the fecal matter and paper and to liquify the contents. In order to accomplish this action, the chemical solution must be maintained at a proper strength and the mixture agitated each time the toilet is used. Odors are produced chiefly by the liberation of ammonia if the caustic solution is weak or if mixing by agitation is not carried out.

Difficulties are encountered when the caustic solution becomes diluted and fails to emulsify the fecal matter. The chemical solution breaks down due to absorption of carbon dioxide from the air and the solution ceases to be caustic. Decomposition of fecal matter takes place with foul odors emanating from the unit.

Sludge disposal.—Disposal of the resultant mixture is a disagreeable task. In the case of small commode types the usual method of disposal is by burial in the earth. Tank units are usually so constructed that the tank is emptied into a seepage pit. When emulsification is not complete, particles of paper clog the seepage pit, thus requiring corrective measures. Because of fundamental differences in design, chemical toilets resemble other types of privies only in the seat construction and manner of venting. Usually risers or stools manufactured commercially are used.

Chemical toilets should be used only where there is assurance of constant maintenance and where safe disposal of the final product is assured. Neither sludge nor liquid effluent from chemical toilet tanks should be discharged to a sewerage system where treatment processes are involved. Otherwise, the chemical constitutents of the sludge or liquid effluent may seriously interfere with the biological action upon which such treatment processes depend.

PAIL OR CAN TYPE PRIVY

A pail or can type of privy is one that employs the use of a watertight container directly beneath the seat for receiving deposits of human excreta.

Function.—This type of privy provides one means of disposal of body wastes under certain conditions. Temporary camps, such as Boy Scout camps, military camps, refugee camps, all of short duration, may well utilize such means of disposal provided the necessary scavenging system is available for regular maintenance.

Disposal of pail contents.—It is essential that there be responsible supervision if this type of disposal is to be expected to function properly. Provision must be made for daily removal of receptacles for cleansing. If scavenging service is to be satisfactory, soiled cans should be replaced by clean ones. The soiled cans should be hauled to a central point where facilities are provided for emptying and cleaning them. If a water supply line is used for can cleaning pur-

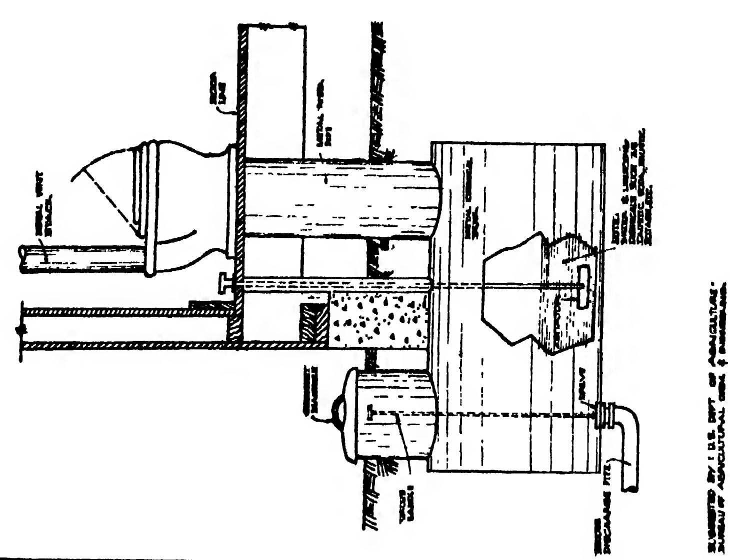


FIGURE 10.—Chemical toilet.

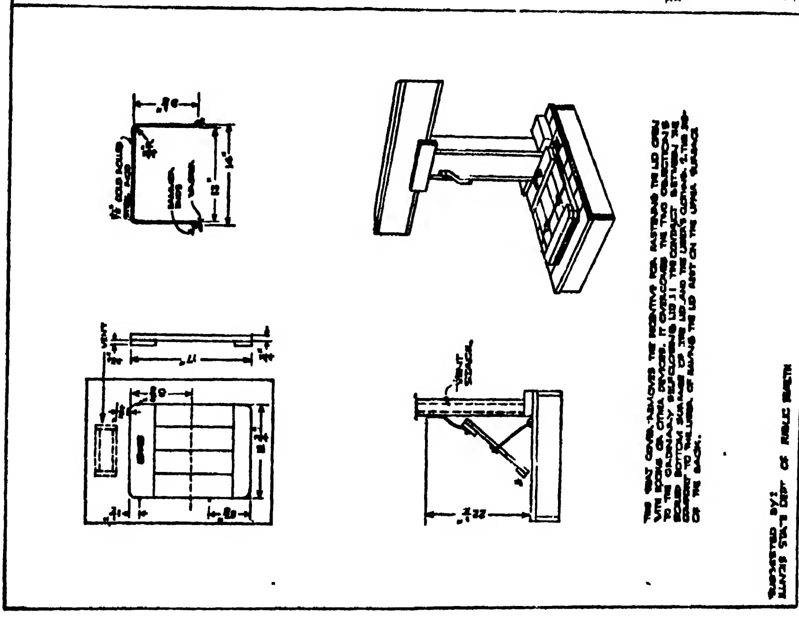


FIGURE 9.—Improved self-closing seat cover

poses, it should be equipped with an approved back flow prevention device. Facilities must be provided for final disposal of the excreta. The methods recommended in order of preference are: (*a*) Disposal into a public sewer system or sewage treatment plant; (*b*) disposal by burial in the ground with immediate covering of earth.

A new type of toilet, originally designed for trailers and airplanes, is in use in portable housing developments such as house trailer camps where sewer systems have not been installed. This toilet provides a special roll of paper coated with asphaltum and by means of a ratchet lever the wastes are folded and sealed in a paper tube or envelope. While this method removes some of the objectional features of the pail and can type privy, the problem of final disposal of the waste remains. Daily removal of excreta is necessary and maintenance of the mechanism is a problem.

There are no pits in this type of privy. Floor, riser, seat, vent, and superstructure requirements are the same for this type of privy as for the earth pit privy.

Since pail or can types of privies are limited in usefulness due to excessive maintenance factors they should be used only in camps of a temporary nature.

CREMATING LATRINE OR INCINERATOR PRIVY

A cremating latrine or incinerator privy is essentially a pit privy designed to permit destruction of the excreta by incineration. Auxiliary fuel is provided to aid destruction of the body wastes.

Function.—This type of privy has been used at some rural schools in the South and the Forest Service has made use of the method in some recreational areas in National Forests. The cremating privy has been found applicable in circumstances where running water is not available, where rock formations are encountered which prohibit digging pits or trenches, where fuel is plentiful and cheap, and where maintenance is available. Units of this type are costly to build because of the fire box, clean-outs, grates, and stack required.

Design and construction.—The pit is fundamentally different for an incinerator privy from that used for the earth pit privy in that provision is made for adding fuel and removing ashes. Vents for this type of privy also differ from those required in other privies because of the need for increased draft. The same type of floor and superstructure may be used as for the earth pit privy; however, the floor must be made of fireproof material. Experience has indicated that it is necessary to utilize metal stools (risers) and lids to prevent flames from destroying them when the solids are incinerated.

This type of unit is not suitable for individual dwellings and should be used only for camps or recreational areas where maintenance is assured and the necessary fuel supply is readily available.

A GIEMSA STAIN OF QUITE CONSTANT COMPOSITION AND PERFORMANCE, MADE IN THE LABORATORY FROM EOSIN AND METHYLENE BLUE [1]

By R. D. Lillie, *Senior Surgeon, United States Public Health Service*

When the eosinate formula (*1*) for compounding Giemsa stain from dyes of American manufacture was worked out, it was hoped that this would solve the problem of duplicating stains satisfactorily. However, continued experience with successive commercial lots from several American manufacturers indicated that commercial azure A, azure B, and azure I were quite variable substances and that considerable study and adjustment of proportions was necessary each time a new lot of Giemsa stain was offered.

On spectroscopic examination of various lots of the azures and methylene blue and their eosinates, the reason for this variability became apparent, as may be seen from table 1.

Considering the relative constancy of the spectroscopic data for methylene blue chloride, it seems that the variation in the azures is probably inherent in their mode of manufacture from methylene blue. If the traditional method of chloroform extraction of the base from weakly alkaline aqueous solution of polychrome methylene blue is employed, the composition of the product will depend to some extent on that of the polychrome methylene blue from which it is prepared. Not only azure I or B and methylene violet appear in the chloroform extract, but also, though in less amounts, azure A and azure C, and the three azures are all reextracted from chloroform solution by weak acetic acid. Consequently, if methylene blue polychromed by an alkali process is employed as a source of azures, a mixed product will be obtained, since alkali polychroming engenders simultaneously a wide variety of the decomposition products of methylene blue. The method of formaldehyde remethylation of crude azure A made by the acid oxidation process does not stop at trimethylthionin as was supposed, but may go on to methylene blue. Experimental extraction of some commercial azure B solutions with chloroform until no more red color was produced in the chloroform has left a deep blue solution with the spectral characteristics of methylene blue and as much as 20 to 25 percent of the color density of the original solution.

Having shown that the acid oxidation process (*2*) produced polychrome methylene blues of quite constant spectroscopic characteristics when the same ratio of $K_2Cr_2O_7$ to methylene blue was used, and that after a certain time interval varying with temperature, further heating was without effect, and that the same product was produced at varying temperatures, it was believed that this process might prof-

[1] From the Division of Pathology, National Institute of Health.

itably be employed in preparing the constituents of Giemsa stain. Trials soon showed that fresh variations appeared when attempts were made to salt out and recrystallize from alcohol. This process of isolation of the dye chloride from solution produced shifts of the absorption maximum of the dye of as much as 5 to 10 mμ.

TABLE 1.—*Variations in absorption spectra of commercial lots of the azures and of methylene blue*

Lot No.	λ	W	M
Azure C			
NIH	617	24	615
AMM No 2	614	25	613
AMM No 8	623	35	623
AMM 22925	611	28	612
NAc-2a	612	34	612
NAc-2b	609	32	613
Azure A			
NIH	627	20	625
NAz-2	624	32	625
NAz-3	617	32	617
NAz-4	613	32	612
NAz-5	620	28	618
NAz-6	619	29	619
NAz-8	624	43	627
NAz-9	625	33	625
NAC No 8847	617	30	617
NAC No 9907	621	34	620
NAC No 10161	627	37	625.
Azure I			
CB No. AMS1	602	22	601
CB No. AMS2	602	24	600
Hr 1918	608	31	607
NAC No 3513	620	46	624
CBS No. 3900	635	37	634
LAz-3	632	42	631
Azure I			
CAz-2 [1]	609	24	608
CAz-2A	633	36	631
CAz-3	631	38	630
CB No 420523	639	41	636
CB No 421104	637	36	635
PCC a	600	22	600
PCC b	596	26	599
Gr 9-24	653	33	648
Azure B			
NIH	645	22	642
NAC No 3769 [3]	654	16	651
NAC No 7724	652	27	648
NAC No 9348a	652	29	649
NAC No 9348b	650	27	649
NAC No 9610	654	25	653
NAC No 9907	655	28	654
NAC No 10161	657	28	656
M B eosin			
Gr	662	24	660
LJr-1	664	21	661
CJr-3	662	22	660
NJr-4	663	22	662
NAC No 10161	659	24	657
NIH No 16E [2]	655	26	654
NIH No. 16D	662	19	661
Methylene blue			
PDC (Th)	661	21	659
CAI (Th)	663	20	661
HSL (TB)	664	19	662
HSL (TB) 78	664	19	661
LA-7a	664	18	663
LA-7b	662	19	660
EA No 1	662	19	661
EA No 2	664	18	662
HL (84)	664	19	663
M No. 41930	661	17	660
Gr 12 13	664	19	663
NA-8	665	18	663
NA-13	662	18	661
NA-15a	662	17	662
NA-15b	662	21	660
NA-16	663	19	662
NA-19a	663	19	661
NA-19b	661	19	661
CA-21	662	18	662
CB No 420843	663	20	661
NAC No. 9907	664	20	662
NAC No. 9781 [3]	663	20	660
NIH No. 23A	664	17	662
NIH No FMB	664	16	663

λ=absorption maximum W indicates width of absorption band, which is determined by measuring the zone throughout which density (D) is at or over 90 percent of its maximum M indicates the median point of this band.

[1] CAz-2 in crude state was apparently largely methylene violet. After extraction into $CHCl_3$ from alkaline solution, and thence back into 1 percent acetic acid, thus separating the azure, the values CAz-2A were obtained.

[2] NIH No 16E and 16D were made both from methylene blue NA-13 and eosin Y LE-12 16E was dried 24 hours at 56° C. from water; 16D, 24 hours at about 35° C from alcohol.

[3] Zinc chloride double salt, a and b denote retests of same lots at approximately 1-year interval

Lot designations are those of the Commission on Standardization of Biological Stains for certified lots, otherwise manufacturers' initials and lot numbers, dates or other distinguishing symbol. NIH designates samples made or repurified in the National Institute of Health. The azures were separated by serial extraction from weak $NaHCO_3$ into $CHCl_3$ and thence into 0 5 percent aqueous acetic acid, segregating portions with λ over 640, 630–640, 620–630, and under 620, and repeating this fractionation five times. Weak $NaHCO_3$ solution of methylene blue was extracted with $CHCl_3$ to remove azures and then acidulated with acetic acid.

It was then decided to prepare eosinates directly from the methylene blue solutions after $K_2Cr_2O_7$ oxidation, $BaCO_3$ neutralization, and filtration. But the boiling with $BaCO_3$ also appeared to produce further polychroming of the solution.

Finally it was found that prompt cooling of the acid solution after completion of oxidation, followed by neutralization with the exact precalculated amount of $NaHCO_3$ at 10°–15° C., immediate precipitation with eosin, and prompt filtration of the precipitate gave a prod-

uct which on repeated trial varied only 2–3 mμ in its absorption maximum and median of the absorption band.

The amount of $K_2Cr_2O_7$ needed to produce a crude azure solution with absorption maximum about 645–647 mμ agrees closely with that theoretically required to oxidize one methyl group from methylene blue, thus:

$$(CH_3)_2NC_6H_3NSC_6H_3N(CH_3)_2Cl+$$
$$O \rightarrow (CH_3)_2NC_6H_3NSC_6H_3NHCH_3Cl+HCHO.$$

The oxygen is supplied by the $K_2Cr_2O_7$ only in acid solution, thus: $H_2Cr_2O_7 \rightarrow 3O+H_2O+Cr_2O_3$; or 1 mole=319 gm. methylene blue+1/3 mole $K_2Cr_2O_7$=294/3=98 gm., yields one mole azure B, and 1 mole of formaldehyde. Allowing an 80–85 percent dye content of methylene blue this is approximately 250 mg. $K_2Cr_2O_7$ per gm. methylene blue. Production of azure A requires approximately twice the amount of $K_2Cr_2O_7$.

The following procedure has given satisfactory eosinates and good stains of Giemsa type as tested on human blood containing malaria parasites and rat blood containing trypanosomes.

Dissolve 10 gm. methylene blue of 85–88 percent dye content in 600 cc. distilled water. Add 6.8 cc. concentrated sulfuric acid (sp. gr. 1.835 to 1.84). Bring to a boil and add 2.5 gm. potassium bichromate dissolved in 25 cc. distilled water. Boil 20 minutes. Cool to 10° C. or lower (place in refrigerator over night). When cold add 17.5 gm. sodium bicarbonate slowly with frequent shaking. Then add a 5-percent solution of eosin Y of about 90 percent dye content and shake constantly until margin of fluid appears pale blue or bluish pink. About 205 cc. will be required and three-fourths of this can be added at once. Filter at once, preferably on vacuum funnel with hard paper. When fluid has been drawn through and surface begins to crack, add 100 cc. distilled water, let drain, and wash again with a second 100 cc. distilled water. Lay the (opened out) filter on a larger piece of filter paper or paper towel and dry overnight on warm plate or in incubator, at 37° C. The drying may be accelerated by using two 100 cc. portions of acetone or, preferably, 95 percent alcohol as washes after the second wash with water. Drying at 55° to 60° C. has been tried, and produces quite a little alteration of the thiazin dye; less if acetone or alcohol washes are used and the heating limited to 2 or 3 hours. This is the crude azure B eosinate.

To make the crude azure A eosinate, proceed exactly as above but take 5 gm. potassium bichromate in place of 2.5 gm. and dissolve it in 50 cc. distilled water.

To make the methylene blue eosinate, dissolve 10 gm. methylene blue in 600 cc. cold distilled water and precipitate as before with 5 percent eosin, filtering and drying as above.

To make the finished stain, grind the three eosinates separately into fine powder in separate clean mortars. (The same mortar may be used if washed out with water, dried with a paper towel, washed with concentrated sulfuric acid until no more green color is liberated, then again with water and alcohol.) Then weigh out 500 mg. crude azure B eosinate, 100 mg. crude azure A eosinate, 400 mg. methlyene blue eosinate, and 200 mg. finely ground methylene blue. Decant the mixed powder onto the surface of 200 cc. of solvent allowing it to settle in gradually. Then shake frequently for 2 or 3 days, keeping the bottle between 50° and 60° C. between shakings.

The traditional solvent is equal parts of glycerin and methyl alcohol. If the bottle is tightly stoppered and the fluid level marked on the outside with a grease pencil or a piece of adhesive, there will be little or no loss from evaporation, and in any case the fluid level can be restored by addition of methyl alcohol. The glycerin should be neutral, anhydrous, and of the purest grade obtainable. If the special methyl alcohol for blood work is unobtainable, ordinary C. P. methanol may be repurified by distillation in glass after adding 4–5 gm. each of silver nitrate and sodium hydroxide. This destroys aldehydes and anchors volatile acids as sodium salts.

The proportions in the foregoing stain mixture will give a very satisfactory picture. Should a deeper blue background or a greener blue tint to parasite cytoplasm be desired in thick film staining, additional aqueous methylene blue solution may be added to the diluted staining mixture. Or for routine use additional methylene blue may be added to the stock solution. The amount may readily be determined by adding to a 50 cc. quantity of a 1 to 50 dilution of the stock stain as much 1:10000 aqueous methylene blue as will produce the desired effect. The addition of 0.1 cc. of 1:10000 aqueous solution is equivalent to the addition of 1 mg. dry stain to 100 cc. stock solution.

SUMMARY

The variations in Giemsa stain due to variations in the composition of the constituent dyes are discussed and some of the reasons are indicated. The relative constancy in character of the product of the oxidation of methylene blue with a definite proportion of potassium bichromate is recalled, and the substitution of eosinates of such crude azures for the usual constituents of Giemsa stain is proposed. The detailed method of preparation is described.

REFERENCES

(1) Roe, M. A., Wilcox, A., and Lillie, R. D.: Eosinates of the azures and methylene blue in preparation of a satisfactory Giemsa stain from dyes of American manufacture. Pub. Health Rep., **56**: 1906–1909 (1941).

(2) Lillie, R. D.: Studies on polychrome methylene blue. II. Acid oxidation methods of polychroming. Stain Technol., **17**: 97–110 (1942).

DEATHS DURING WEEK ENDED FEBRUARY 27, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Feb 27, 1943	Corresponding week, 1942
Data for 89 large cities of the United States		
Total deaths	10,2[illegible]0	9,085
Average for 3 prior years	9,236	
Total deaths, first 8 weeks of year	81,377	74,203
Deaths under 1 year of age	724	517
Average for 3 prior years	535	
Deaths under 1 year of age, first 8 weeks of year	5,731	4,472
Data from industrial insurance companies:		
Policies in force	65,395,887	64,[illegible]27,623
Number of death claims	12,451	11,930
Death claims per 1,000 policies in force, annual rate	9.9	9.6
Death claims per 1,000 policies, first 8 weeks of year, annual rate	10.6	10.1

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 6, 1943

Summary

Continued favorable health conditions, except for the unusua prevalence of meningococcus meningitis, are indicated by reports for the current week. The figures for measles and poliomyelitis are slightly above the respective 5-year (1938–42) medians, while the numbers of cases of the other six communicable diseases included in the following table are below the respective medians.

A total of 531 cases of meningococcus meningitis was reported for the week, exclusive of delayed reports of 15 cases in Virginia and 10 in Arizona, as compared with a total of 484 for the preceding week. This is the largest number reported for any week on record, and brings the cumulative total for the first 9 weeks of the current year to 3,515, more than 25 percent above the largest number reported in any other 9-week period of the past 16 years. Current totals for geographic divisions are above those for the preceding week in all except the East South Central, West South Central, and Mountain groups of States. States reporting the largest numbers were New York (63), California (46), Washington (31), Pennsylvania (29), Missouri (29), New Jersey (25), Massachusetts (23), North Carolina (23), and Maryland (21).

Other reports for the week include the following: Anthrax, 4 cases; dysentery, 391; infectious encephalitis, 14; tularemia, 7; endemic typhus fever, 43.

Deaths in 87 large cities of the United States during the current week aggregated 9,567 as compared with 10,198 for the preceding week. The accumulated total for the first 9 weeks of the current year is 90,310, as compared with 82,930 for the same period of last year.

Telegraphic morbidity reports from State health officers for the week ended March 6, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria: Week ended— Mar. 6, 1943	Diphtheria: Week ended— Mar. 7, 1942	Diphtheria: Median 1938–42	Influenza: Week ended— Mar. 6, 1943	Influenza: Week ended— Mar. 7, 1942	Influenza: Median 1938–42	Measles: Week ended— Mar. 6, 1943	Measles: Week ended— Mar. 7, 1942	Measles: Median 1938–42	Meningitis, meningococcus: Week ended— Mar. 6, 1943	Meningitis, meningococcus: Week ended— Mar. 7, 1942	Meningitis, meningococcus: Median 1938–42
NEW ENG.												
Maine	1	1	1	-----	----	3	1	129	129	8	2	0
New Hampshire	0	0	0	-----	20	-----	31	6	23	0	0	0
Vermont	0	0	0	----	----	-----	412	4	23	2	0	0
Massachusetts	2	8	5	----	-----	-----	910	593	593	23	11	3
Rhode Island	0	3	0	1	-----	-----	27	160	14	19	0	0
Connecticut	0	1	1	2	1	7	259	375	150	9	4	1
MID. ATL.												
New York	24	30	23	[1] 12	[1] 17	[1] 68	2,040	678	1,224	63	5	5
New Jersey	2	6	10	17	11	29	1,299	322	322	25	5	1
Pennsylvania	8	11	28	3	-----	-----	2,891	11	254	29	4	6
E. NO. CEN.												
Ohio	7	16	16	8	18	18	292	261	261	6	3	3
Indiana	9	9	12	30	35	52	400	50	50	10	0	1
Illinois	16	14	32	23	16	49	835	493	493	15	1	1
Michigan [2]	0	4	4	5	1	20	40	241	320	9	0	0
Wisconsin	0	1	1	50	52	173	958	647	668	4	0	0
W. NO. CEN.												
Minnesota	3	5	3	----	7	7	58	775	253	4	0	0
Iowa	3	2	3	10	1	65	298	325	192	2	0	0
Missouri	4	1	13	6	3	32	387	255	141	29	1	1
North Dakota	0	0	0	-----	5	44	53	77	11	0	0	0
South Dakota	5	2	1	-----	----	2	125	14	14	0	0	0
Nebraska	3	3	0	55	38	2	371	[illegible]	42	5	0	0
Kansas	6	2	5	14	8	41	428	319	382	3	1	1
SO. ATL.												
Delaware	0	0	1	-----	-----	-----	52	7	7	1	0	0
Maryland [2]	36	5	5	18	29	55	46	584	115	21	2	2
Dist. of Col	2	2	7	3	3	4	113	46	19	4	2	2
Virginia	6	13	13	595	652	1,509	338	128	252	[3] 31	3	0
West Virginia	4	5	7	38	52	113	32	229	229	3	0	0
North Carolina	6	12	14	75	52	52	33	1,356	1,356	23	3	3
South Carolina	3	4	5	705	1,028	1,028	59	192	192	13	3	1
Georgia	10	8	3	201	144	144	143	365	200	4	1	1
Florida	2	3	9	3	5	9	47	165	188	5	0	0
E. SO. CEN.												
Kentucky	5	8	8	7	4	107	854	71	71	13	1	3
Tennessee	5	2	4	42	187	187	259	79	80	7	1	1
Alabama	10	2	6	155	233	490	65	148	228	16	1	1
Mississippi	3	6	6	-----	-----	-----	-----	-----	-----	9	0	-----
W. SO. CEN.												
Arkansas	5	4	4	108	236	711	90	243	146	5	0	0
Louisiana	1	5	5	8	4	30	178	85	59	16	3	1
Oklahoma	5	4	6	76	176	222	34	293	58	0	1	0
Texas	35	37	40	1,634	1,734	1,658	472	2,222	594	6	4	4
MOUNTAIN												
Montana	1	0	0	8	25	25	162	90	49	1	0	0
Idaho	0	0	1	-----	-----	1	149	26	26	2	0	0
Wyoming	0	2	0	14	227	1	122	77	77	1	1	1
Colorado	6	7	7	30	73	64	607	207	167	1	0	0
New Mexico	2	3	2	1	8	8	12	111	60	1	0	0
Arizona	1	1	3	115	218	181	29	214	31	[3] 10	0	0
Utah [2]	1	0	1	71	5	17	445	93	130	9	0	0
Nevada	0	0	-----	10	-----	-----	2	16	-----	0	0	-----
PACIFIC												
Washington	7	0	4	-----	3	4	841	150	150	31	1	1
Oregon	1	1	1	29	25	38	456	142	142	12	0	0
California	20	17	21	77	101	101	741	3,987	462	46	6	5
Total	270	270	321	4,319	5,457	10,117	18,496	17,191	17,191	[3] 556	70	47
9 weeks	2,750	2,909	3,716	40,673	44,521	51,047	114,932	114,719	114,719	3,515	573	481

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 6, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1938-42	Week ended—		Median 1938-42	Week ended—		Median 1938-42	Week ended—		Median 1938-42
	Mar. 6, 1943	Mar. 7, 1942		Mar. 6, 1943	Mar. 7, 1942		Mar. 6, 1943	Mar. 7, 1942		Mar. 6, 1943	Mar. 7, 1942	
NEW ENG.												
Maine	1	0	0	4	6	7	0	0	0	0	0	0
New Hampshire	0	0	0	14	8	4	0	0	0	0	0	0
Vermont	0	0	0	8	7	7	0	0	0	0	1	0
Massachusetts	0	0	0	476	272	221	0	0	0	1	0	1
Rhode Island	0	0	0	27	17	15	0	0	0	0	0	0
Connecticut	0	1	0	61	42	82	0	0	0	1	0	0
MID. ATL.												
New York	3	0	1	560	475	638	0	0	0	6	7	5
New Jersey	0	1	0	136	199	199	0	0	0	1	2	2
Pennsylvania	0	1	1	0	563	404	0	0	0	5	2	3
E. NO. CEN.												
Ohio	0	2	1	278	309	399	0	1	1	0	4	3
Indiana	0	0	0	127	166	170	7	0	1	0	1	1
Illinois	0	0	1	213	333	510	1	4	6	0	2	2
Michigan [2]	0	0	0	113	261	414	0	0	4	1	1	1
Wisconsin	0	0	0	305	176	170	0	0	5	1	0	0
W. NO. CEN.												
Minnesota	0	2	0	79	131	118	0	1	9	0	3	1
Iowa	0	0	0	92	48	65	1	0	4	1	0	0
Missouri	0	0	0	118	75	101	0	2	4	0	1	1
North Dakota	0	0	0	10	20	17	0	0	0	0	0	0
South Dakota	0	0	0	21	40	23	1	0	3	0	0	0
Nebraska	1	0	0	67	57	41	3	0	0	0	0	0
Kansas	0	0	0	76	102	102	0	0	2	2	0	0
SO. ATL.												
Delaware	0	0	0	6	63	15	0	0	0	0	0	0
Maryland [2]	0	0	0	91	91	61	0	0	0	8	1	1
District of Columbia	0	0	0	26	13	20	0	0	0	0	1	0
Virginia	1	1	0	42	31	35	0	0	0	4	0	1
West Virginia	0	0	0	30	35	53	1	0	0	0	0	1
North Carolina	1	2	1	45	35	45	0	0	0	1	0	0
South Carolina	0	0	0	8	3	4	0	0	0	0	0	1
Georgia	0	0	0	11	38	15	0	0	0	3	14	4
Florida	1	0	0	12	7	8	0	0	0	0	9	5
E. SO. CEN.												
Kentucky	0	1	0	61	100	89	0	0	0	1	2	2
Tennessee	1	1	0	48	73	73	0	2	4	1	3	3
Alabama	1	1	1	26	18	18	0	0	0	0	1	1
Mississippi	1	0	1	10	10	8	1	1	0	2	0	1
W. SO. CEN.												
Arkansas	0	1	0	5	6	9	1	1	1	1	1	1
Louisiana	0	2	1	11	6	11	0	0	0	1	5	5
Oklahoma	0	1	0	27	11	31	0	2	2	0	1	1
Texas	4	1	1	63	79	79	0	6	6	4	6	6
MOUNTAIN												
Montana	0	2	0	11	35	31	0	0	0	0	1	0
Idaho	0	0	0	2	3	18	0	0	0	0	0	0
Wyoming	0	0	0	67	19	6	0	0	0	0	0	1
Colorado	0	0	0	53	36	36	0	0	0	2	2	2
New Mexico	0	0	0	5	10	17	0	0	0	0	0	1
Arizona	1	0	0	12	16	10	0	0	0	1	0	0
Utah [2]	0	0	0	73	23	24	0	0	0	0	0	0
Nevada	0	0	------	0	2	------	0	0	------	0	0	------
PACIFIC												
Washington	1	0	0	26	66	63	0	0	1	1	0	2
Oregon	0	1	0	14	9	32	0	0	1	5	1	0
California	2	2	2	144	122	175	0	0	0	2	4	2
Total	19	23	18	3,741	4,357	5,147	16	20	67	56	76	76
9 weeks	249	232	232	34,154	34,622	40,913	247	190	640	465	721	721

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 6, 1943, and comparison with corresponding week of 1942 and 5-year median—Continued

Division and State	Whooping cough			Week ended Mar. 6, 1943								
	Week ended—		Median 1938-42	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	Mar. 6, 1943	Mar. 7, 1942			Amebic	Bacillary	Unspecified					
NEW ENG.												
Maine	29	26	46	0	0	0	0	0	0	0	0	0
New Hampshire	12	15	15	0	0	0	0	0	0	0	0	0
Vermont	35	63	42	0	0	0	0	0	0	0	0	0
Massachusetts	173	183	183	0	0	1	0	0	0	0	0	0
Rhode Island	33	52	29	0	0	0	0	0	0	0	0	0
Connecticut	40	122	63	0	0	0	0	1	0	0	0	0
MID. ATL.												
New York	397	536	491	0	14	7	0	3	0	0	0	1
New Jersey	209	286	177	1	0	0	0	0	0	0	0	0
Pennsylvania	346	227	285	1	0	0	0	1	0	0	0	0
E. NO. CEN.												
Ohio	177	170	159	0	0	0	0	0	0	0	0	0
Indiana	40	40	27	0	0	0	1	0	0	0	0	0
Illinois	177	170	121	1	0	3	0	1	0	0	0	0
Michigan [2]	191	130	177	0	0	0	0	0	0	0	0	0
Wisconsin	269	273	141	0	0	0	0	0	0	0	0	0
W. NO. CEN.												
Minnesota	91	43	35	0	1	0	0	0	0	0	0	0
Iowa	27	18	19	0	0	0	0	0	0	0	0	0
Missouri	9	12	39	0	0	0	1	1	0	0	0	0
North Dakota	22	30	14	0	0	0	0	0	0	0	0	0
South Dakota	0	1	6	0	0	0	0	0	0	0	0	0
Nebraska	4	6	6	0	0	0	0	0	0	0	0	0
Kansas	59	58	58	0	0	0	0	1	0	0	1	0
SO. ATL.												
Delaware	15	0	6	1	0	0	0	0	0	0	0	0
Maryland [2]	109	54	84	0	0	0	2	0	0	0	0	1
Dist. of Col.	22	31	11	0	0	0	0	0	0	0	0	0
Virginia	77	51	67	0	1	0	0	0	0	0	2	0
West Virginia	40	60	53	0	0	0	0	0	0	0	0	0
North Carolina	178	77	211	0	1	0	0	0	0	0	0	2
South Carolina	28	94	94	0	0	0	0	0	0	0	0	2
Georgia	37	38	12	0	0	0	1	0	0	0	1	7
Florida	19	23	21	0	0	0	0	0	0	0	0	2
E. SO. CEN.												
Kentucky	28	98	67	0	0	0	0	2	0	0	0	0
Tennessee	50	26	41	0	1	0	0	0	0	0	1	0
Alabama	8	4	24	0	0	0	0	1	0	0	0	0
Mississippi	------	------	------	0	0	0	0	0	0	0	1	0
W. SO. CEN.												
Arkansas	20	16	17	0	1	1	0	0	0	0	0	0
Louisiana	2	6	12	0	0	2	0	1	0	0	1	0
Oklahoma	25	9	9	0	0	0	0	0	0	0	0	1
Texas	485	167	167	0	1	264	0	1	0	0	0	27
MOUNTAIN												
Montana	18	6	10	0	0	0	0	1	0	0	0	0
Idaho	2	9	9	0	0	0	0	0	0	0	0	0
Wyoming	2	1	1	0	0	0	0	0	0	0	0	0
Colorado	28	61	35	0	0	0	0	0	0	0	0	0
New Mexico	21	19	36	0	1	1	0	0	0	0	0	0
Arizona	17	62	28	0	0	0	9	0	0	0	0	0
Utah [2]	54	23	51	0	0	0	0	0	0	0	0	0
Nevada	6	37	------	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	18	130	107	0	0	0	0	0	0	0	0	0
Oregon	13	35	13	0	0	0	0	0	0	0	0	0
California	272	309	309	0	3	10	0	0	0	0	0	0
Total	3,934	3,907	3,999	4	24	289	20	14	0	0	7	43
9 weeks	34,878	36,162	36,162	------	------	------	------	------	------	------	------	------

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Delayed reports are included (Virginia, 15; Arizona, 10).

WEEKLY REPORTS FROM CITIES

City reports for week ended February 20, 1943

This table lists the reports from 85 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga	0	0	27	1	16	0	4	0	6	0	0	0
Baltimore, Md	0	0	4	1	17	12	17	0	41	0	1	53
Billings, Mont	2	0		0	0	0	1	0	1	0	0	3
Birmingham, Ala	3	0	6	0	0	0	7	0	1	0	0	5
Boise, Idaho	0	0		0	0	0	0	0	0	0	0	0
Boston, Mass	0	0		0	157	2	18	0	138	0	0	35
Bridgeport, Conn	1	0		0	4	2	0	0	3	0	0	0
Brunswick, Ga	0	0		0	1	0	2	0	0	0	0	0
Buffalo, N. Y	1	0		0	119	1	14	0	15	0	0	11
Camden, N. J	0	0		0	45	1	2	0	4	0	0	1
Charleston, S. C	1	0	111	1	2	0	2	0	1	0	0	0
Charleston, W. Va	0	0		0	0	0	0	0	1	0	0	0
Chicago, Ill	7	0	2	1	309	11	25	0	75	0	1	52
Cleveland, Ohio	0	0	5	2	11	2	14	0	44	0	0	36
Columbus, Ohio	0	0	1	1	4	0	2	0	13	0	0	6
Concord, N. H	0	0		0	0	0	2	0	2	0	0	0
Cumberland, Md	0	0		0	1	0	3	0	0	0	0	2
Dallas, Tex	1	0	2	0	2	0	7	0	6	0	0	5
Detroit, Mich	4	0		6	101	3	16	0	45	0	0	100
Duluth, Minn	0	0		0	0	0	2	0	6	0	0	0
Fall River, Mass	0	0		0	6	0	1	0	1	0	0	22
Fargo, N. Dak	0	0		0	2	0	0	0	0	0	0	1
Flint, Mich	0	0		0	10	0	0	0	6	0	0	3
Fort Wayne, Ind	0	0		0	0	0	1	0	1	0	0	0
Frederick, Md	0	0		0	1	0	1	0	0	0	0	0
Galveston, Tex	0	0		0	0	0	3	0	0	0	0	4
Grand Rapids, Mich	0	0		0	2	0	3	0	0	0	0	7
Great Falls, Mont	0	0		0	17	0	0	0	2	0	0	13
Hartford, Conn	0	0		0	15	1	4	0	2	0	0	0
Helena, Mont	0	0		0	27	0	0	0	0	0	0	0
Houston, Tex	10	0		2	3	0	7	1	6	0	0	1
Indianapolis, Ind	1	0		2	86	2	16	1	18	0	0	11
Kansas City, Mo	1	1		0	73	3	13	0	55	0	0	0
Kenosha, Wis	0	0		0	0	0	0	0	2	0	0	0
Little Rock, Ark	0	0		0	0	0	4	0	0	0	0	1
Los Angeles, Calif	4	0	43	1	70	2	8	4	31	0	0	45
Lynchburg, Va	0	0		0	0	0	1	0	0	0	0	0
Memphis, Tenn	0	0		0	1	0	4	0	9	0	0	2
Milwaukee, Wis	0	0		0	411	0	3	0	131	0	0	41
Minneapolis, Minn	0	0		0	11	2	6	0	19	0	0	12
Missoula, Mont	0	0		0	0	0	0	0	0	0	0	0
Mobile, Ala	0	0	11	2	0	0	3	0	0	0	0	0
Nashville, Tenn	0	0		0	83	0	5	0	0	0	0	9
Newark, N. J	0	0	5	0	36	3	13	0	10	0	0	12
New Haven, Conn	0	0	1	0	2	1	6	0	1	0	0	1
New Orleans, La	1	1	4	3	95	2	15	0	9	0	2	1
New York, N. Y	14	1	5	4	200	37	83	0	318	0	2	48
Omaha, Nebr	0	0		0	5	0	5	0	7	0	0	4
Philadelphia, Pa	2	0	4	5	1,376	10	36	0	101	0	3	59
Pittsburgh, Pa	0	0		1	6	3	11	[3] 0	11	0	0	24
Portland, Maine	0	0		0	0	7	3	0	4	0	0	3
Providence, R. I	0	0	10	0	11	7	6	0	8	0	0	24
Pueblo, Colo	0	0		0	2	0	2	0	3	0	0	8
Racine, Wis	0	0	1	1	12	0	0	0	59	0	0	1
Reading, Pa	0	0		2	138	0	2	0	1	0	0	10
Richmond, Va	0	0	1	1	9	2	4	0	1	0	1	.

See footnotes at end of table.

City reports for week ended February 20, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Roanoke, Va	0	0	-----	0	0	0	1	0	0	0	0	1
Rochester, N Y	0	0	-----	0	11	0	5	0	14	0	0	24
Sacramento, Calif	1	0	-----	0	6	5	1	0	1	0	0	1
Saint Joseph, Mo	0	0	-----	0	0	0	2	0	0	0	0	1
Saint Louis, Mo	3	0	3	2	21	11	24	0	33	0	0	7
Saint Paul, Minn	0	0	-----	0	1	1	4	0	1	0	0	54
Salt Lake City, Utah	0	0	-----	0	77	2	3	0	28	0	0	6
San Antonio, Tex	2	0	2	1	3	0	4	0	3	0	0	9
San Francisco, Calif	2	0	4	0	46	4	14	1	21	0	0	16
Savannah, Ga	1	0	23	4	0	0	2	0	0	0	0	4
Seattle, Wash	1	0	-----	2	72	0	4	1	3	0	0	19
Shreveport, La	1	0	-----	0	0	0	6	0	0	0	0	0
South Bend, Ind	0	0	-----	0	6	0	0	0	1	0	0	0
Spokane, Wash	0	0	-----	0	159	0	6	0	0	0	0	1
Springfield, Ill	0	0	-----	0	0	0	1	0	0	0	0	0
Springfield, Mass	0	0	-----	0	3	0	0	0	103	0	0	0
Superior, Wis	0	0	-----	0	1	0	3	0	0	0	0	6
Syracuse, N Y	0	0	-----	0	14	2	4	0	17	0	0	7
Tacoma, Wash	1	0	-----	0	32	1	0	0	0	0	0	0
Tampa, Fla	0	0	-----	0	2	0	2	0	1	0	0	0
Terre Haute, Ind	1	0	---	0	1	0	1	0	1	0	0	0
Topeka, Kans	0	0	-----	0	47	0	6	0	4	0	0	2
Trenton, N J	0	0	2	0	35	0	6	0	10	0	0	0
Washington, D C	1	0	4	1	80	2	13	0	24	0	0	10
Wheeling, W. Va	0	0	-----	0	1	0	4	0	2	0	0	3
Wichita, Kans	1	0	1	0	14	0	9	0	3	0	0	6
Wilmington, Del	0	0	-----	0	10	2	9	0	1	0	0	5
Winston-Salem, N. C	0	0	-----	0	0	0	3	0	1	0	0	14
Worcester, Mass	0	0	-----	0	123	0	8	0	18	0	0	2
Total	68	3	282	41	4,254	146	553	8	1,508	0	10	878
Corresponding week 1942	70	4	293	38	2,963	23	477	6	1,392	0	11	1,058
Average, 1938–42	100	----	968	[1] 92	[2] 4,100	------	[1] 606	-----	1,433	23	18	1,021

[1] 3-year average, 1940–42.
[2] 5-year median
[3] The report of 10 cases of poliomyelitis in Pittsburgh for the week ended January 16, 1943, (Public Health Reports for Feb. 5, 1943, p. 242) was in error. There have been no cases reported in Pittsburgh this year.

Dysentery, amebic.—Cases: Dallas, 1; New York, 12

Dysentery, bacillary.—Cases Birmingham, 1; Buffalo, 2; Charleston, S C., 2; Los Angeles, 6; New Haven, 1; New York, 92

Dysentery, unspecified —Cases: San Antonio, 1.

Tularemia.—Cases. Mobile, 1.

Typhus fever.—Cases. Los Angeles, 1; Nashville, 1.

PLAGUE INFECTION IN TACOMA, WASH.

Plague infection has been reported proved in tissue and fleas from rats (*R. norvegicus*) taken in industrial sections of Tacoma, Wash., as follows: February 8, in a specimen of tissue from 2 rats, and in a pool of 41 fleas from 72 rats; February 15, in 2 pools, respectively, of 33 fleas from 36 rats and 52 fleas from 51 rats.

FOREIGN REPORTS

BRAZIL

Para (Belém)—Amebic dysentery.—Information dated February 4, 1943, states that during the week an outbreak of amebic dysentery occurred in Para, Brazil, where at least 100 cases were reported at Val de Cans Airport and a considerable number of cases in the city proper. The source of infection has not been definitely established, but the outbreak is thought to be well under control.

CANADA

Provinces—Communicable diseases—Week ended February 6, 1943.—During the week ended February 6, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	2	6		142	342	38	42	30	64	666
Diphtheria	2	20		38		5		4		69
Dysentery (bacillary)				122						122
German measles		1		9	12		12	1	5	40
Influenza		12			4	2			14	32
Measles		5	4	123	155	32	139	13	96	567
Meningitis, meningococcus			1	3	6				3	13
Mumps		117	2	48	1,149	124	147	90	145	1,822
Poliomyelitis				3						3
Scarlet fever		11	8	124	110	9	36	18	36	352
Tuberculosis (all forms)		3	4	88	49	16	23	13	10	206
Typhoid and paratyphoid fever		2		12	1	1				16
Undulant fever				2				2		4
Whooping cough		6	1	172	93	38	2	79	29	420

JAMAICA

Notifiable diseases—4 weeks ended February 13, 1943.—During the 4 weeks ended February 13, 1943, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	2	4	Puerperal fever		2
Diphtheria	3	2	Tuberculosis	36	73
Dysentery	1	1	Typhoid fever		18
Leprosy		6	Typhus fever	2	

SWEDEN

Notifiable diseases—December 1942.—During the month of December 1942, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	5	Poliomyelitis	47
Diphtheria	235	Scarlet fever	2,528
Dysentery	60	Syphilis	52
Epidemic encephalitis	1	Typhoid fever	8
Gonorrhea	1,242	Undulant fever	5
Paratyphoid fever	4	Weil's disease	2

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Palestine—Tel-Aviv.—During the week ended January 30, 1943, one case of plague was reported at Tel-Aviv, Palestine.

Typhus Fever

Afghanistan.—According to information dated January 8, 1943, for the year 1942 a total of 2,439 cases of typhus fever were hospitalized in Government hospitals in Afghanistan, of which 487 died. It was stated that these figures would probably be doubled if nonhospitalized cases were included. It is estimated that about 5 percent of the population of Kabul and Jalalabad had typhus fever in 1942. The mortality rate of about 15 percent is said to be unusually low. Prisons and barracks are the most infected places. A report dated February 16, 1943, states that since January 8 over 400 new cases of typhus fever had been admitted to the military hospital in Kabul. Additional information dated February 22, 1943, states that an epidemic of typhus fever has broken out in two small villages near the British Legation on the outskirts of Kabul. Over 120 cases are said to have occurred within a week.

Bulgaria.—For the period January 14 to February 3, 1943, 136 cases of typhus fever were reported in Bulgaria.

Germany.—A report dated February 24, 1943, states that for the first 9 months of 1942 a total of 2,043 civilian cases of typhus fever were reported in German territory as of 1919, as compared with 395 cases for the year 1941. The numbers of cases reported by quarters for 1942 are as follows: First quarter, 418; second quarter, 1,151;

third quarter, 474. The distribution of cases reported for 1942 shows a high prevalence in industrial areas instead of the prevalence in 1941 in provinces bordering Poland.

Rumania.—For the period February 2–15, 1943, 349 cases of typhus fever were reported in Rumania.

Yellow Fever

Colombia—Intendencia of Meta.—On February 2, 1943, one death from yellow fever was reported in Intendencia of Meta, Colombia.

COURT DECISION ON PUBLIC HEALTH

Filled milk law upheld.—(Kentucky Court of Appeals; *Carolene Products Co.* v. *Hanrahan, Commonwealth's Atty., et al.*, 164 S. W. (2d) 597; decided November 28, 1941, rehearing denied October 23, 1942.) A Kentucky statute made it unlawful to manufacture for sale or sell or exchange any filled milk. Filled milk was defined as "any milk, cream, or skimmed milk, whether or not condensed, evaporated, concentrated, powdered, dried, or desiccated, to which has been added, or which has been blended or compounded with, any fat or oil other than milk fat, so that the resulting product is an imitation or semblance of milk, cream, or skimmed milk, whether or not condensed, evaporated" etc. The plaintiff company brought an action seeking a declaration of rights and injunctive relief against threatened multiplicity of prosecutions under the act. It was alleged by the plaintiff that its products were manufactured by adding refined bland coconut oil and vitamin A and vitamin B concentrates to pure sweet skimmed milk and that thereafter this mixture was evaporated in the same manner as sweet whole or skimmed milk is evaporated in the manufacture of evaporated milks and the product canned by modern and approved processes. The defendants demurred to the petition, thus admitting as true all facts well pleaded but denying that such facts constituted a cause of action. The demurrer was sustained by the trial court and the plaintiff appealed. The contentions made by the plaintiff before the Kentucky Court of Appeals were (1) that the filled milk act did not apply to the plaintiff's products, and (2) that the act, if construed to so apply, was unconstitutional because violative of the fourteenth amendment to the Federal Constitution and of certain specified sections of the State constitution.

The appellate court considered first the matter of constitutionality and, with reference to the act offending the Federal Constitution, said that it thought that this question had been definitely set at rest by the case of *United States* v. *Carolene Products Co.*, 304 U. S. 144 (1938), in which the Supreme Court of the United States held constitutional a Federal act which was almost identical with the Kentucky act. Under that decision the fact that articles within the prohibited class were wholesome and nutritive did not render the Federal act unconstitutional for the reason that Congress was justified in determining that prohibition of the entire class was necessary. By taking judicial notice of the report of the Congressional committee to the effect that prohibition of all the products involved was necessary because of the impracticability of separating the good from the bad, the supreme court satisfied itself of the existence of a rational basis for the legis-

lation. According to the court of appeals, the fact that, since the supreme court decision, the plaintiff had added vitamins to its product and that there had been no Congressional or legislative investigation or report on the subject in no way detracted from the decision's binding effect. The addition of the vitamins only had the effect of making the plaintiff's product more wholesome and nutritive, and the wholesome and nutritive character of the product was assumed by the supreme court when the decision was reached.

With respect to whether the Kentucky act violated the State constitution the court of appeals said that it was in thorough accord with the reasoning of the supreme court decision, even though such decision was not binding as concerned this question, and was of the opinion that the act was not violative of the State constitution, since the aggregate effect of the restraints imposed on State legislative action by the State constitutional provisions relied on was in substance the equivalent of the 14th amendment insofar as the instant controversy was concerned.

Nor was the act's constitutionality rendered any less certain by the plaintiff's allegations (1) that the legislation was unnecessary because the plaintiff alone was engaged in marketing the products involved, and (2) that the statute was passed in disregard of the findings of the State board of health. "There was a rational basis supporting the legislative action, as heretofore indicated * * *." It was the court's conclusion that the act was a reasonable exercise of the police power.

Coming to a consideration of the plaintiff's other contention that the act did not apply to plaintiff's products, the appellate court took the view that such products were filled milk within the meaning of the act. "When considered in their entirety, appellant's allegations are insufficient to show that its product is not in semblance of milk but, on the contrary, establish this to be a fact." Also decided adversely to the plaintiff were its arguments (1) that its products were so different from others of the prohibited class as to be without the reason for the prohibition, and (2) that the public had been fully informed as to the products and that there was no possibility of fraud in connection with their sale. The court stated that, as already indicated, the wholesome and nutritive qualities of the products did not remove them from the prohibited class and that, as far as fair labelling was concerned, it had to be assumed that the legislature had determined that prohibition of false labelling would fail to furnish adequate protection and that, therefore, complete prohibition, not regulation, was required to accomplish the legislative purpose.

The judgment of the trial court dismissing the petition was affirmed.

×

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease, (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON . 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50

Public Health Reports

VOLUME 58 MARCH 19, 1943 NUMBER 12

IN THIS ISSUE

U.S. PUBLIC HEALTH SERVICE 1798

CONTENTS

Public Health Reports

Vol. 58 • MARCH 19, 1943 • *No. 12*

WHAT'S PAST IS PROLOGUE

ACADEMIC QUALIFICATIONS OF REGISTERED NURSES AS REVEALED BY THE 1941 NATIONAL SURVEY OF REGISTERED NURSES

By HENRIETTA LANDAU, *Associate Public Health Nursing Consultant, States Relations Division, United States Public Health Service*

The first National Survey of Registered Nurses[1] was launched in January 1941. Almost 460,000 questionnaires were distributed, and about 300,000 nurses responded.[2] Considerable information regarding the total number of nurses who participated in the 1941 Survey is now available. In this paper discussion will be limited to the educational qualifications of nurses as determined by data gathered directly from the questionnaires. To give more meaning to a discussion of the educational status of nurses in 1941 a short review of the profession's past attainments may be in order.

In 1871 Godey's Lady's Book advocated, in an editorial, that the "calling of sick nurse" be "elevated to a profession which an educated lady might adopt without a sense of degradation." The physician, it reasoned, was now held in high respect because he was a "well educated and thoroughly trained professional man." So nursing, it argued, could become an established, respected, and useful profession if its members were well educated and thoroughly trained (*1*). The 1941 Survey figures of 289,286 registered nurses give clear evidence that nursing, quantitatively at least, is established. But how well educated are the members of this profession?

In 1923, but two short decades ago, the Committee for the Study of Nursing Education reported that the "defective preparation and qualifications of many instructors in schools of nursing * * * is very marked;" that "an improvement in the quality * * * of public health nurses is fundamental * * *," and that the industrial nurse's lack of training for her special field "has been a grave handicap

[1] Assistance in the preparation of these materials was furnished by the personnel of the Work Projects Administration, Official Project No. 165-2-23-300.

[2] This is the third in a series of articles relating to the Survey of Registered Nurses. The earlier articles appeared in the January and June 1942 issues of the American Journal of Nursing.

* * *" (*2*). This Committee concluded that graduation from high school and from a good school of nursing afforded sufficient preparation for the private duty and the hospital graduate staff nurse, but superintendents, supervisors, instructors, and public health nurses (including nurses in industry) should in all cases receive additional training beyond the basic nursing course. It is interesting to note that no mention is made here of the advisability, much less the necessity, of a college degree for any group, though the suggestion appears elsewhere in the report that, ideally, instructors should be "professional teachers."

In 1928 the Committee on the Grading of Nursing Schools announced, after a study of the educational background of nurses in ten States, that only 49 percent were high school graduates, including 15 percent with 1 or more years of college; 40 percent had attended high school for 3 years or less, and 11 percent had never gone beyond grade school (*3*). In 1934 the Grading Committee strongly recommended that no school of nursing accept students with less than high school graduation and that "except for unusual and important reasons" all members of the nursing school faculty be college graduates. In this 1934 final report the Committee outlined "the pathway to progress" as it viewed the status of nursing education after 8 years of study (*4*). And now, from the data collected in the National Survey of Registered Nurses, some attempt can be made to determine where, on this "pathway to progress," the profession stood in 1941.

Information regarding academic qualifications is available for 255,527 of the total 289,286 nurses who returned their questionnaires; the information for the remaining group could not be determined because of insufficient data. Therefore all totals and percentages discussed will be in terms of the 255,527 questionnaires reviewed for purposes of this study. This number includes 159,672 active nurses and 95,855 inactive nurses.

Academic qualifications have been divided into five categories. "College graduation" includes all nurses who had academic degrees such as A. B., B. S., M. A., M. S., Ph. D., and such professional degrees as Bachelor of Nursing and Master of Nursing. "Postgraduate work without college graduation" includes nurses who had had some postgraduate clinical or other advanced nursing or academic courses but who did not hold college degrees. The three remaining categories—"high school graduation without postgraduate work," "high school work without graduation" and "no high school work"—are self-explanatory.

Approximately 4 percent of the 255,527 nurses were college graduates; 24 percent had had some college or advanced clinical education, and 56 percent were high school graduates only. In other words, 84 percent of all the nurses were high school graduates; approx-

imately 15 percent had not completed high school, and 1 percent did not get beyond grade school.

These figures have been further analyzed according to active and inactive nurses by type of position. Active nurses were those employed in nursing work at the time of the inventory; inactive nurses included the nurses not employed in nursing work at that time. It may be recalled that the questionnaire used in the 1941 Survey requested nurses to indicate their present or last active nursing employment by general type. Type of nursing could be checked as institutional, public health, industrial, private duty, or other. All nurses whose type of employment could not fall into one of the first four groups were considered "other." This latter group includes nurses in physicians' offices, air and rail stewardesses, nurses in key positions such as executive secretaries of State nurses associations, etc. The figures for "other" will be shown in the tables to follow; but the discussion of educational qualifications by type of position will be limited to the four more or less homogeneous types. Table 1 brings out some rather interesting variations.

TABLE 1.—*Distribution of active and inactive nurses in different position classifications, by academic qualifications*

Type of position and employment status	All nurses		Percent of nurses with designated academic qualifications				
	Number	Percent	College graduation	Postgraduate work without college graduation	High school graduation without postgraduate work	High school work without graduation	No high school work
Grand total	255,527	100.0	3.7	24.2	56.2	14.2	1.3
Active	159,672	100.0	4.6	26.7	56.0	11.7	1.0
Inactive	95,855	100.0	2.1	20.2	57.5	18.3	1.9
Institutional							
Active	80,802	100.0	5.2	26.3	58.2	9.5	.8
Inactive	34,194	100.0	2.9	23.2	58.5	14.1	1.3
Public health							
Active	17,619	100.0	12.7	55.9	22.2	8.5	.7
Inactive	6,614	100.0	7.4	42.6	33.3	15.1	1.6
Industrial:							
Active	5,416	100.0	1.4	23.4	57.8	15.8	1.6
Inactive	3,310	100.0	1.0	17.5	57.7	21.4	2.4
Private duty:							
Active	46,006	100.0	1.0	16.4	65.0	16.0	1.6
Inactive	44,223	100.0	.8	14.1	60.8	21.8	2.5
Other:							
Active	9,829	100.0	3.7	28.5	55.1	11.7	1.0
Inactive	7,514	100.0	2.4	23.6	54.9	18.1	1.0

Of the 160,000 actively employed nurses, nearly 5 percent were college graduates as compared with 2 percent of the total inactive nurses. The relative number of the active and inactive nurses who were high school graduates is practically the same; but, at the other end of the educational scale, the percentage of inactive nurses without *any* high school education is nearly double the percentage in the active group. Further study of table 1 clearly shows that nurses in active

employment in 1941 possessed, on the whole, higher academic qualifications than the unemployed or inactive nurses.

An analysis of the academic background by type of position brings out some further interesting differences. It will be noted that public health nurses were in the lead in their academic attainments; private duty and industrial groups had the smallest number with advanced educational qualifications. This pattern is fairly constant throughout the analysis. Thirteen percent of the active public health nurses held college degrees. About 56 percent had had some college work but did not have college degrees. Five percent of the active institutional nurses were college graduates, and a little over 26 percent had had some postgraduate education. Approximately 10 percent of the active institutional and 9 percent of the public health nurses had not completed high school; active industrial and private duty nurses showed 17 percent in that category. Much progress has been made, however, since the Grading Committee's publication of "Nurses, Patients, and Pocketbooks." In one of its studies this committee found that only 42 percent of the private duty nurses then employed were high school graduates; further, that only 22 percent of the institutional and 20 percent of the public health nurses had completed some college work (*3*). The 1941 Survey shows that 82 percent of the active private duty nurses were high school graduates. Institutional nurses showed only a 10-percent gain since 1928 in the percentage of nurses with some postgraduate preparation, but it must be remembered that the total institutional nurses in 1941 included a much greater proportion of general staff nurses. According to "Facts about Nursing" only 27 percent of the hospitals connected with nursing schools in 1927 employed graduate nurses for general duty; in 1937, 90 percent of the hospitals connected with schools of nursing employed graduate nurses for general duty (*5*). As a general rule, the institutional graduate staff nurses are not required to have had any postgraduate education.

Figures for active and inactive nurses have also been separated into two age groups: nurses under 40 and those 40 years and over. There were 187,209 active and inactive nurses under 40 years of age and 68,318 nurses 40 years old and over. Some striking differences are apparent in the educational qualifications of these two groups. The older nurses led in the percentage of those who held college degrees or who had had some postgraduate education—34 percent as against 27 percent. But figures for this same 40-year-and-over group also show a dramatic high at the other end of the scale. There were still 33 percent of the older nurses and 9 percent of the younger members who were not high school graduates. This might be expected, of course, since even among the group under 40 years of age there were no doubt many nurses who entered schools of nursing 10

or 15 years ago. Educational opportunities for the youth of that day were far more limited than today, and fewer schools of nursing required high school graduation as a prerequisite for entrance.

These facts stand out: The educational preparation of the inactive nurses was consistently lower than for the active nurses. The older nurses had the edge on the younger ones in their advanced preparation, but 91 percent of the younger nurses were high school graduates as against 67 percent in the older group. Actually, in terms of educational progress, these are encouraging facts.

In table 2 an analysis has been made of the educational qualifications of active nurses according to the two age groups and by type of position; the same break-down has been made in table 3 for the inactive nurses.

TABLE 2.—*Distribution of active nurses under 40 years of age and 40 years of age and older in different position classifications, by academic qualifications*

Type of position and age group	All nurses		Percent of nurses with designated academic qualifications				
	Number	Percent	College graduation	Postgraduate work without college graduation	High school graduation without postgraduate work	High school work without graduation	No high school work
Total active	159,672	100.0	4.6	26.7	56.0	11.7	1.0
Under 40	120,586	100.0	4.0	24.7	63.8	7.2	.3
40 and over	39,086	100.0	6.3	32.8	31.9	25.6	3.4
Institutional							
Under 40	64,045	100.0	4.4	24.8	64.8	5.8	.2
40 and over	16,757	100.0	8.3	31.9	32.8	24.0	3.0
Public health							
Under 40	10,398	100.0	13.8	57.0	24.8	4.1	.3
40 and over	7,221	100.0	11.1	54.4	18.6	14.7	1.2
Industrial.							
Under 40	3,828	100.0	1.5	22.2	66.1	9.8	.4
40 and over	1,588	100.0	1.3	26.1	37.8	30.6	4.2
Private duty.							
Under 40	34,832	100.0	1.0	15.0	73.7	10.0	.3
40 and over	11,174	100.0	1.0	20.5	38.1	34.7	5.7
Other							
Under 40	7,483	100.0	2.9	26.4	62.7	7.8	.2
40 and over	2,346	100.0	5.9	35.2	31.7	24.5	2.7

Approximately 76 percent of the total active nurses were under 40 years of age. Among the inactive nurses about 70 percent were under 40 years. The difference in the ratio between active and inactive nurses under 40 years of age was too small to warrant the conclusion that age was the only factor accounting for the variations in academic background in the respective groups. Other factors without doubt entered into this picture; but for purposes of this study the discussion will be limited to the factors of age, type of position, and geographic location.

TABLE 8.—*Distribution of inactive nurses under 40 years of age and 40 years of age and older in different position classifications, by academic qualifications*

Type of position and age group	All nurses		Percent of nurses with designated academic qualifications				
	Number	Percent	College graduation	Postgraduate work without college graduation	High school graduation without postgraduate work	High school work without graduation	No high school work
Total inactive	95,855	100 0	2.1	20 2	57.5	18.3	1.9
Under 40	66,623	100.0	2.1	18.5	67 0	11.9	.5
40 and over	29,232	100.0	2.2	23.9	35 9	32.9	5.1
Institutional:							
Under 40	25,610	100.0	2.6	21.7	66 4	8 9	.4
40 and over	8,584	100 0	3 7	27.6	34.8	29.7	4.2
Public health:							
Under 40	3,401	100.0	10.0	42.7	39 6	7.4	3
40 and over	3,213	100 0	4.8	42.5	26.6	23.0	3.1
Industrial:							
Under 40	2,173	100 0	1.0	16.5	68 1	13 7	7
40 and over	1,137	100.0	.9	19.2	38.0	36.2	5.7
Private duty:							
Under 40	30,032	100.0	.8	12.6	71.2	14 7	.7
40 and over	14,191	100.0	.8	17.3	38.6	36 9	6.4
Other:							
Under 40	5,407	100.0	2 3	22 0	62 8	12 7	.2
40 and over	2,107	100.0	2.[illegible]	27.7	34.6	22 9	3.0

It may be of interest to note that although the nurses under 40 years of age greatly outnumbered the older nurses in institutional and private duty nursing, this was not the case in public health nursing. Only about 27 percent of the total number of private duty and 22 percent of the institutional nurses were 40 years old or over; nearly 44 percent of all public health nurses were in the 40-year-and-over group. When the educational qualifications of nurses under 40 years of age and nurses 40 years old and over are studied according to type of position, a fairly consistent variation appears in the two age groups for each type of nursing. There is one significant divergence. Only in public health nursing did the younger and not the older group lead in the number who had some postgraduate education. This is true of the inactive as well as the active public health nurses. A few obvious reasons for this trend may be suggested. Public health agencies usually require some advanced educational preparation of general staff nurses. This has been especially the case for the young nurse entering the public health field. The older experienced nurse already employed is more likely to be exempt from this requirement. On the other hand, advanced nursing preparation for the institutional nurse is usually required only of nurses holding positions above the general staff level. Since institutional staff nurses outnumber the administrators, supervisors, and instructors in that field, the measure of their educational preparation heavily weights the total picture.

To follow this thought further, data for all active institutional, public health, and other nurses have been arranged by sphere of

responsibility (table 4). All nurses who listed their functions under administration, supervision, teaching, or any combination of these are designated as "administrative nurses;" all others are designated as "general staff."[3]

TABLE 4.—*Distribution of active administrative and staff nurses in different position classifications, by academic qualifications*[1]

Type of position and sphere of responsibility	All nurses		Percent of nurses with designated academic qualifications				
	Number	Percent	College graduation	Postgraduate work without college graduation	High school graduation without postgraduate work	High school work without graduation	No high school work
Total:							
Administrative	44,017	100 0	11 1	37 6	41 4	9 3	0 6
Staff	64,233	100 0	3.0	27.0	59 4	9.8	.8
Institutional:							
Administrative	36,481	100 0	9.5	34.2	45.6	10 0	.7
Staff	44,321	100.0	1 6	19 7	68.5	9 4	.8
Public health:							
Administrative	5,867	100.0	20 7	59 1	14 8	5 1	.3
Staff	11,752	100.0	8.7	54 3	26 0	10 2	.8
Other							
Administrative	1,669	100 0	10.2	38 2	40.0	11 0	.6
Staff	8,160	100.0	2.3	26 5	58.3	12.0	.9

[1] Private duty and industrial nurses are not included since there is but one category for the private duty nurse and since few industrial nurses hold other than staff positions.

Approximately 10 percent of the administrators, in institutional nursing, compared with 2 percent of their general staff members, held college degrees. In public health nursing 21 percent of the administrators and 9 percent of the staff were college graduates. Of the total nurses with administrative responsibilities 34 percent of the institutional nurses compared with 59 percent of the public health nurses had had some advanced educational preparation. About 20 percent of the institutional general staff nurses had taken some advanced work while 54 percent of the public health staff nurses had done so. However, it must again be emphasized that members of a public health nursing staff were, in many instances, required to have some postgraduate education; institutional general staff were not.

It may be relevant here to compare the general educational qualifications of the active institutional staff nurses with those of the private duty nurses. As noted above, 20 percent of the institutional staff nurses had had some advanced education; in private duty 16 percent of the active nurses were so prepared (table 1). Ninety percent of the institutional staff nurses, including those with college degrees or some postgraduate education, were high school graduates,

[3] Private duty and industrial nurses are not included in tables 4, 5, and 6, since there is but one category for the private duty nurse and since few industrial nurses hold other than staff positions.

while only 82 percent in the private duty group had completed high school.

Since the factor of age apparently accounts for some of the differences in educational qualifications in the various groups of nurses studied, tables 5 and 6 have been included. In table 5 active administrators have been analyzed according to the two age groups. Table 6 shows similar analysis for the general staff nurse.

TABLE 5.—*Distribution of active administrative nurses under 40 years of age and 40 years of age and older in different position classifications, by academic qualifications* [1]

Type of position and age group	All nurses		Percent of nurses with designated academic qualifications				
	Number	Percent	College graduation	Postgraduate work without college graduation	High school graduation without postgraduate work	High school work without graduation	No high school work
Total, active administrative nurses	44,017	100 0	11 1	37 6	41 4	9 3	0 6
Under 40	30,348	100 0	9 7	36 4	48 4	5 4	1
40 and over	13,669	100 0	14 3	40 6	25.7	17.7	1.7
Institutional							
Under 40	26,264	100 0	8 5	33 7	51 9	5 8	1
40 and over	10,217	100.0	12 5	35 7	29 4	20 3	2.1
Public health							
Under 40	2,991	100 0	20 9	60 0	16 8	2 2	.1
40 and over	2,876	100 0	20 5	58 2	12 7	8 1	5
Other.							
Under 40	1,093	100 0	8 0	36 5	48 9	6 4	2
40 and over	576	100 0	14 6	41 3	23 8	18 9	1.4

[1] Private duty and industrial nurses are not included, since there is but one category for the private duty nurse and since few industrial nurses hold other than staff positions.

TABLE 6.—*Distribution of active staff nurses under 40 years of age, and 40 years of age and older, in different position classifications, by academic qualifications* [1]

Type of position and age group	All nurses		Percent of nurses with designated academic qualifications				
	Number	Percent	College graduation	Postgraduate work without college graduation	High school graduation without postgraduate work	High school work without graduation	No high school work
Total, active staff nurses	64,233	100 0	3 0	27.0	59 4	9.8	0.8
Under 40	51,578	100 0	3 0	24.7	66.0	6 0	.3
40 and over	12,655	100 0	3 0	35 9	32 3	25.6	3 2
Institutional:							
Under 40	37,781	100 0	1.6	18 6	73.7	5.9	2
40 and over	6,540	100.0	1 8	26 1	38.2	29.7	4.2
Public health:							
Under 40	7,407	100.0	11 0	55 7	28.1	4.9	.3
40 and over	4,345	100 0	4 8	51 9	22 5	19 1	1.7
Other.							
Under 40	6,390	100 0	2.1	24 6	65.0	8 0	.3
40 and over	1,770	100 0	3.0	33 2	34.4	26.3	3.1

[1] Private duty and industrial nurses are not included since there is but one category for the private duty nurse and since few industrial nurses hold other than staff positions.

With a few exceptions, the figures in tables 5 and 6 follow the same pattern as those in the earlier tables. There were more than twice as many institutional administrators under 40 years of age as there were institutional administrators 40 years old and over. In public health nursing, however, there was practically the same number of administrators in the two age groups. About 9 percent of the institutional administrators under 40 years of age were college graduates; 13 percent of the institutional administrators 40 years old and over held college degrees. In public health nursing nearly 21 percent of the administrators in both age groups were college graduates.

An analysis of the academic qualifications of general staff nurses (table 6) revealed that 2 percent of the institutional staff nurses in both age groups held college degrees. In public health nursing, however, the staff nursing group under 40 years of age had a higher proportion of college graduates (11 percent) than the public health group 40 years old and over (5 percent). The staff nurses 40 years old and over in both the public health and institutional groups showed a high percentage of nurses who had not completed high school; nearly 30 percent in institutional nursing and 20 percent in public health were not high school graduates.

Tables 5 and 6 confirm the following general impressions: Administrators in all types of nursing were better qualified, on the whole, than general staff nurses; a relatively high proportion of public health staff nurses had had advanced postgraduate education; in institutional nursing the older nurses—both administrative and staff—led the younger nurses in the percentage of those who had graduated from college or had taken some postgraduate work; in public health nursing the younger nurses—both administrative and staff—had higher academic qualifications than the older public health nurses.

The data so far presented give the total national picture of the status of nursing education in 1941. Ours is a far-flung country; the specific contribution to this national picture made by each geographic area is shown in table 7.[4] Geographic areas are those used by the Bureau of the Census.

It might be expected that the data representing the various geographic areas would follow the general pattern shown in the national totals. Several deviations, however, are apparent. The New England and Pacific areas show the highest percentage of nurses 40 years of age and over. In these areas, therefore, one would look for a higher proportion of nurses with some postgraduate education and a higher proportion who had not completed high school. This was not the case. New England showed a low percentage of nurses with some postgraduate education and a high percentage of the older nurses

[4] Nurses were included in the total count of the State in which they were working at the time of the 1941 Survey. See appendix for tabulation of data by States.

who had completed high school. The Pacific area, in spite of having the highest percentage of nurses 40 years of age and over, also had a high proportion of high school graduates and led the country in its number of nurses with higher academic qualifications.

TABLE 7.—*Distribution of active nurses in different geographic areas by academic qualifications*

Geographic area[1]	All nurses		Percent of nurses with designated academic qualifications				
	Number	Percent	College graduation	Postgraduate work without college graduation	High school graduation without postgraduate work	High school work without graduation	No high school work
Total, active nurses	159,672	100 0	4.6	26 7	56.0	11.7	1.0
New England	18,666	100 0	3.2	24 9	59 0	12.1	.8
Middle Atlantic	39,706	100.0	4.3	26.8	53 2	14.7	1.0
East North Central	31,195	100.0	5.1	25 3	59 8	8.7	1.1
West North Central	15,301	100 0	5.2	26 2	57 7	9.6	1.3
South Atlantic	15,459	100 0	3 8	25 5	59 0	10.7	1 0
East South Central	5,873	100.0	4 0	27 0	55 5	12 5	1.0
West South Central	10,225	100 0	3.3	26 1	56.9	12.3	1.4
Mountain	6,124	100.0	5.3	29 0	54.9	10 0	.8
Pacific	15,630	100 0	7 0	32 7	48.5	10 8	1 0
Possessions	1,493	100 0	4.3	25.1	41 9	23.2	5 5

[1] The geographic areas as established by the Bureau of the Census contain the following States: New England—Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut; Middle Atlantic—New York, New Jersey, Pennsylvania; East North Central—Ohio, Indiana, Illinois, Michigan, Wisconsin; West North Central—Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas; South Atlantic—Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, [illegible] ona, [illegible] Puerto Rico, Alaska, Territory of Hawaii.

Data for Puerto Rico present a striking contrast to the Territories of Hawaii and Alaska. There were 510 active nurses under 40 years of age and 69 nurses in the 40-year-and-over group in Puerto Rico. Despite the high proportion of younger nurses, the academic qualifications of the Puerto Rican nurses were startlingly low. Forty-four percent of the nurses under 40 years of age were high school graduates and only 29 percent of the older nurses had completed high school. The percentages for the Territories of Hawaii and Alaska were similar to those for the Pacific area.

SUMMARY

Answers to the earlier question, "How well educated were the nurses of 1941?," may now be summarized as follows:

1. Actively employed nurses had better educational qualifications than the nurses who had dropped out of the profession.

2. Eighty-seven percent of all active nurses were high school graduates. The percentage of high school graduates among nurses under 40 years of age was 93 compared with 71 for the 40-year-and-over group.

3. Twenty-seven percent of the nurses actively employed had taken some postgraduate work. This number does not include the nurses holding college degrees.

4. About 5 percent of all active nurses were college graduates. Percentages for college graduates by type of position follow: Institutional, 5 percent;[5] public health, 13 percent; industrial, 1 percent; private duty, 1 percent; other, 4 percent.

5. A larger proportion of nurses under 40 years of age held administrative, supervisory, and teaching positions in hospitals and schools of nursing than in public health nursing. However, more of the administrative nurses in the field of public health than in institutions had had some postgraduate preparation.

6. In 1941, 44 percent of the active administrators, instructors, and supervisors in institutional nursing, 69 percent of all active public health nurses, and 25 percent of the active industrial nurses had taken some postgraduate work including those with college degrees. These figures are significant when compared with the recommendations of the Committee for the Study of Nursing Education which emphasized that superintendents, supervisors, instructors, and all public health nurses (including nurses in industry) receive additional training beyond the basic nursing course (*2*).

7. Academic qualifications of nurses varied slightly with the several geographic areas in the United States. The Pacific area had the highest proportion of nurses with higher academic qualifications; New England showed the smallest percentage of nurses with advanced educational preparation.

Where then was the nursing profession on the "pathway to progress" in 1941?

Nursing has traveled far since 1928 when only 49 percent of the nurses were high school graduates. In 1941, 87 percent of the active nurses had completed high school. There can be little doubt that the nursing profession agrees with Esther Lucile Brown (*6*) that "adequate preparation constitutes one of the most important elements of successful practice." Its progress has been steadily and consistently in the direction of more "adequate preparation." However, from the figures presented it is also evident that although nursing can point with pride to its past performance, it must diligently and forever

[5] If the academic qualifications of the institutional group are analyzed by specific type of responsibility, it is found that 23 percent of the full-time instructors were college graduates.

bear in mind that this past has but paved the way for future accomplishment.

The national picture of nursing education in 1941 would truly justify the nurse of today in saying to the nurse of tomorrow:

"Whereof what's past is prologue, what to come
In yours and my discharge"(*7*).

REFERENCES

(*1*) Godey's Lady's Book. February 1871. (A reprint of the editorial can be found in the American Journal of Nursing, Vol. 31, No. 9, September 1931.)

(*2*) The Committee for the Study of Nursing Education in the United States, Josephine Goldmark, secretary: Nursing and Nursing Education in the United States. Macmillan, New York, 1923.

(*3*) Committee on the Grading of Nursing Schools, May Ayres Burgess, director Nurses, Patients, and Pocketbooks. Report of a Study on the Economics of Nursing. Committee on the Grading of Nursing Schools, New York City, 1928.

(*4*) Committee on the Grading of Nursing Schools: Nursing Schools Today and Tomorrow. Final Report. Committee on the Grading of Nursing Schools, New York City, 1934.

(*5*) The Nursing Information Bureau of the American Nurses' Association: Facts About Nursing, 1941. Nursing Information Bureau of the American Nurses' Association, New York City, 1941.

(*6*) Brown, Esther Lucile: Nursing as a Profession. Russell Sage Foundation, New York, 1936.

(*7*) Shakespeare, William: The Tempest, Act II, Scene I.

Appendix

Distribution of active nurses in States, Territories, and the District of Columbia, by academic qualifications [1]

State	All nurses		Percent of nurses with designated academic qualifications				
	Number	Percent	College graduation	Postgraduate work without college graduation	High school graduation without postgraduate work	High school work without graduation	No high school work
Total, active nurses	159,672	100.0	4.6	26.7	56.0	11.7	1.0
Alabama	1,162	100.0	3.3	23.2	60.8	12.1	.6
Alaska	143	100.0	8.4	42.0	43.3	6.3	0
Arizona	580	100.0	4.3	28.8	52.9	13.4	.5
Arkansas	867	100.0	2.3	23.8	58.2	14.4	1.3
California	10,668	100.0	6.4	34.7	47.3	10.8	.8
Colorado	2,379	100.0	6.2	29.5	54.0	9.4	.9
Connecticut	4,711	100.0	4.9	22.8	56.2	14.9	1.3
Delaware	436	100.0	1.8	24.8	64.7	8.5	.2
District of Columbia	1,706	100.0	4.9	30.7	55.6	8.0	.7
Florida	1,459	100.0	2.9	28.7	56.2	13.0	1.1
Georgia	1,671	100.0	3.5	26.6	59.1	10.0	.8
Hawaii	771	100.0	5.3	33.2	50.3	10.5	.6
Idaho	542	100.0	7.4	24.5	56.1	11.4	.6
Illinois	8,334	100.0	5.2	25.9	59.0	9.2	.7
Indiana	4,191	100.0	4.1	26.0	59.9	8.9	1.2
Iowa	3,024	100.0	4.8	23.0	60.7	10.1	1.4
Kansas	1,874	100.0	4.5	24.5	58.8	11.3	1.0
Kentucky	1,512	100.0	4.2	33.1	47.2	14.6	.9
Louisiana	3,273	100.0	2.9	22.5	63.4	10.4	.8
Maine	1,404	100.0	1.7	23.6	63.3	10.5	.9
Maryland	3,097	100.0	5.3	22.9	59.8	10.3	1.7
Massachusetts	9,722	100.0	2.9	26.9	58.8	10.9	.6
Michigan	5,252	100.0	5.6	28.1	56.2	9.0	1.0
Minnesota	4,418	100.0	5.6	26.9	58.4	8.1	1.0
Mississippi	879	100.0	1.5	23.3	64.8	9.6	.8
Missouri	4,118	100.0	5.0	27.1	54.8	11.3	1.9
Montana	1,051	100.0	3.8	24.2	60.6	10.6	.8
Nebraska	917	100.0	8.1	33.0	53.0	5.5	.4
Nevada	108	100.0	2.8	28.7	56.5	12.0	0
New Hampshire	1,311	100.0	1.2	19.9	62.7	14.9	1.2
New Jersey	6,280	100.0	3.2	27.1	52.5	16.5	.6
New Mexico	480	100.0	5.2	33.5	48.0	12.2	1.1
New York	17,656	100.0	5.9	31.2	47.6	15.0	.3
North Carolina	2,002	100.0	3.5	28.3	60.4	7.4	.3
North Dakota	386	100.0	6.0	28.5	55.7	7.8	2.1
Ohio	9,771	100.0	5.5	22.8	62.7	8.3	.8
Oklahoma	1,432	100.0	4.5	25.3	57.8	11.5	.8
Oregon	1,892	100.0	9.1	27.8	52.3	9.9	1.0
Pennsylvania	15,769	100.0	3.1	21.7	59.8	13.6	1.8
Puerto Rico	579	100.0	1.9	10.2	30.2	44.4	13.3
Rhode Island	987	100.0	3.1	27.3	58.8	10.2	.6
South Carolina	948	100.0	2.7	23.5	66.7	6.8	.2
South Dakota	565	100.0	3.9	23.2	62.1	9.2	1.6
Tennessee	2,320	100.0	5.1	26.2	54.8	12.6	1.2
Texas	4,653	100.0	3.3	29.4	51.8	13.5	2.0
Utah	658	100.0	5.2	38.0	51.2	5.3	.3
Vermont	531	100.0	3.0	17.9	66.3	12.0	.8
Virginia	2,598	100.0	3.6	25.8	57.9	11.8	.8
Washington	3,070	100.0	7.8	28.6	50.5	11.5	1.6
West Virginia	1,542	100.0	2.0	20.4	57.6	18.1	1.9
Wisconsin	3,647	100.0	4.4	26.7	59.9	8.4	.7
Wyoming	326	100.0	4.0	22.7	61.0	10.7	1.5

[1] Based upon active nurses who participated in the 1941 survey of registered nurses

A COMPARISON OF RABBIT AND HORSE SERUMS IN MENINGOCOCCUS INFECTIONS[1]

By Sara E. Branham, *Senior Bacteriologist, United States Public Health Service*

Ever since antimeningococcic serum came into use it has been made in horses, and, in this country at least, it has been polyvalent. There have been logical reasons for both of these practices. Accurate laboratory diagnosis in meningococcus infections is often slow, and, in past years, typing usually required at least 2 days after the initial cultures were made. The prompt injection of a polyvalent serum was for many years the only specific therapy. The preparation of a good serum in horses has always been a long process, usually requiring about 2 years.

The use of the sulfonamides in the treatment of meningococcus meningitis has altered the situation considerably. The clinician now has other agents which can be given immediately upon making the clinical diagnosis.

There are some cases, however, in which other treatment is indicated. There is a great variation in susceptibility of different strains of meningococci to these drugs (*1*) and occasionally cases are encountered which are due to strains that are very resistant. This resistance seems inherent in the strain and is different, apparently, from the "drug fastness" which is also occasionally met. Some persons do not tolerate some of the sulfonamides well, and in some old people and young children large doses of these drugs are contraindicated for various reasons. Sometimes, without explainable cause, the patient merely fails to improve.

Experimental studies with mice have shown (*1*) that in these animals the combination of the sulfonamides and serum has a higher protective value than either agent alone, and that when serum is used, less of the drug is necessary. Thus it seems that the need for antimeningococcic serum, though limited, is real. It is therefore important that attention be focused upon quality rather than quantity. It seems desirable to examine data obtained by studying a number of antimeningococcus serums which were processed by the prevailing methods.

This report summarizes data obtained during recent months in the Division of Biologics Control of the National Institute of Health from samples of therapeutic antiserums submitted by manufacturers for release. These were all prepared in horses and comprise both whole and refined and concentrated serums. Also included are a number of monovalent serums, representing chiefly Group I meningococci, prepared in horses or rabbits for experimental purposes. Some of the latter were prepared by Doctor Fritz of the Gilliland Laboratories, some by Doctor Joyner of the Lederle Laboratories, some by Dr.

[1] From the Division of Biologics Control, National Institute of Health.

Margaret Pittman of the National Institute of Health, and some by the author.

These serums were compared by means of a mouse protection test (2) which has been previously described. The same strain of Group I meningococcus, NIH 1027, was used for testing throughout and was maintained at "maximum virulence." The usual National Institute of Health meningococcus control serum M19, an unconcentrated polyvalent horse serum, was included in all tests. In the following tables the values of the serums studied have been expressed in relation to this M19, arbitrarily taking the value 100 to represent it.

Table 1 presents the values obtained with 50 polyvalent horse serums, 25 concentrated and 25 unconcentrated. These were not selected serums but represent the first 25 of each class received at the National Institute of Health after July 1, 1941. They are arranged in order of value, beginning with the lowest.

TABLE 1.—*Comparison of concentrated and whole antimeningococcic horse serums with a control serum*

Concentrated serum		Whole serum	
Number of serum	Value, percent, of M19 [1]	Number of serum	Value, percent, of M19 [1]
1	100	1	101
2	111	2	102
3	112	3	110
4	127	4	110
5	133	5	112
6	134	6	113
7	141	7	121
8	144	8	123
9	149	9	125
10	165	10	133
11	181	11	138
12	200	12	140
13	215	13	147
14	237	14	148
15	294	15	150
16	315	16	155
17	322	17	157
18	333	18	170
19	385	19	189
20	400	20	191
21	400	21	193
22	406	22	207
23	420	23	225
24	489	24	248
25	490	25	267

[1] Control, M19=100.

Each of these represents a pool from several horses. All horses had been immunized for at least a year, and some for a number of years. Although some of each class barely reached the required minimum value, it can be seen that the best unconcentrated serums were two to three times the value of the control and the best of the concentrated were four to five times the control in protective action for mice. As would be expected, a far larger number of the concentrated serums gave these higher figures, 14 of the concentrated serums

giving more than twice the protection of the control, whereas only 4 of the whole serums showed such a value.

Table 2 presents a study of monovalent (Group I) horse serums. This gives a fair idea of the length of time necessary for immunizing horses and shows the gradual development in titer for a strain of the homologous group. Good serums were obtained from these horses (No. 481 and No. 487), though at the end of the first year neither horse gave serum with protective value equal to one-half that of the control. After 2 years' immunization one horse (No. 487) gave serum equal to the control, whereas the other serum (Horse No. 481) was approximately twice as much. Concentrated serums from these horses gave values approximately three and four times that of the control. These two monovalent serums have given excellent protection in experimental work. It is seen, therefore, that good monovalent serums can be made in horses, though the period of immunization is long.

TABLE 2.—*Development of protective antibodies in two horses immunized with single strains of Group I meningococci*

Horse No. 481				Horse No. 487			
Number bleeding	Date of bleeding	Period of immunization (months) [1]	Value, percent, of M19 [2]	Number bleeding	Date of bleeding	Period of immunization (months) [1]	Value, percent, of M19 [2]
1	Nov. 18, 1939	4	6	1	Nov. 18, 1939	4	2
2	Jan. 15, 1940	6	22	2	Jan. 15, 1940	6	9
4	Mar. 25, 1940	8½	25	5	Apr. 15, 1940	9	10
5	Apr. 15, 1940	9	38	6	May 9, 1940	10	10
6	May 9, 1940	10	42	7	July 10, 1940	12	24
7	July 10, 1940	12	63	19	Dec. 29, 1941	25	108
11	Apr. 23, 1941	21	197	20	Jan. 5, 1942	26	181
23	Concentrated pool		293	26	Concentrated pool		484

[1] Immunization of both horses began July 12, 1939.
[2] M19=100.

Table 3 shows results obtained in rabbits with monovalent (Group I) serums. More than one bleeding was studied from many of these rabbits so that 23 serums from 16 rabbits are represented in the table. These had been prepared by the four persons mentioned above.

The most conspicuous finding, brought out by this table, is the relatively short time required to produce a serum of good protective titer in a rabbit as compared with a horse. Within 4 to 6 months a protective value equal to that of the control could be obtained in most rabbits as compared with the 2 years required by the horses as shown in table 2.

Serums 1–13 in table 3 are single bleedings from individual rabbits. Results obtained with these show that different strains vary in antigenicity, and, under the circumstances of these experiments, a serum seems to protect better against its homologous strain than against

others, even of the same serological group. This is a good argument in favor of pooling serums from a number of rabbits. Serums 14 to 18 represent pools from a number of rabbits.

TABLE 3.—*Values found in monovalent (Group I) rabbit serums expressed in relation to control M19*[1]

Serial number	Serum	Immunization period (months)	Value, percent, of M19	Nature of serum
1	1209	5	444	Immunized with strain 1027 (I). Tested with homologous strain 1027 (I).
2	1210	5	288	
3	1250A	2	57	
4	1250B	4	141	
5	1251A	2	44	
6	1251B	4	160	
7	1242A	1	21	Immunized with heterologous strain 1041 (I), a poor antigen. Tested with 1027 (I).
8	1242B	4	70	
9	1243A	1	14	
10	1243B	4	35	
11	1244	4	56	Immunized with heterologous strain 1168 (I). Tested with 1027 (I).
12	1245A	1	20	
13	1245B	4	87	
14	M1A	5	87	Pools of rabbits immunized with Group I strains. Tested with 1027 (I).
15	M1B	12	132	
16	10A	1–4	116	
17	10B	1–6	225	
18	21	4–10	790	
19	16	2–6	470	Group I serums, pooled, concentrated, and refined. Tested with 1027 (I).
20	22	1–9	1,022	
21	23	4–10	826	
22	25	2–10	1,000	
23	37	2–10	426	

[1] M19=100.

When pooled rabbit serums were refined and concentrated the protective value was far better than that of the concentrated serums from horses. The concentrated monovalent horse serums shown in table 2 had values of three to four times the control, whereas these concentrated rabbit serums, Nos. 19 to 23, representing a shorter period of immunization, were four to ten times the control.

The limited data in these three tables strongly suggest that a good antimeningococcus serum can be produced more simply, quickly, and effectively in rabbits than in horses. Certainly such serums have given better protection in mice. Only monovalent serums from rabbits have been studied so far, but they have seemed superior to monovalent horse serums and have required much less time and expense to prepare. No polyvalent horse serum shown in table 1 has equaled some of the rabbit serums. The highest value obtained for a concentrated polyvalent horse serum was approximately five times the control, whereas some of the concentrated rabbit serums were more than ten times the control.

There is ample precedent for the use of refined and concentrated rabbit serum in other human infections. Horsfall, Goodner, and

their coworkers (*3*) introduced rabbit serum in the treatment of pneumonias due to various types of the pneumococcus.

The use of rabbit serum in the pneumonias is now on an established basis, as shown by numerous clinical reports (*4*). Since refined and concentrated rabbit serum has been used safely and successfully in the treatment of such infections, there seems to be no contraindication to its use in meningococcus infections. It is suggested that such rabbit serum, when it is available, be given clinical trial in those human cases of meningococcus infection in which serum is indicated.

To recommend that rabbit serum be polyvalent or monovalent would be premature at this time. Ideally, the administration of a sulfonamide would be followed when indicated, by a monovalent serum, for the serological group of meningococcus involved. Where cultures have been made from spinal fluid or blood before drug therapy has been instituted such a course would be entirely practicable. An increasing number of clinicians and institutions, as well as the United States Army, request "typing" routinely.

On the other hand, it is sometimes impossible to isolate and "type" the meningococcus even though the microorganisms have been seen in a stained smear from spinal fluid. In such cases it would seem that a polyvalent serum might be definitely indicated.

In all of the epidemics studied during the last 20 years, more than 90 percent of the cases of meningococcus infection have been due to strains of serological Group I.

SUMMARY

Horse and rabbit antimeningococcic serums, both whole serum and refined and concentrated, have been studied by means of a mouse protection test.

Refined and concentrated serums have been found better than whole serums in protecting mice.

Rabbit serum, refined and concentrated, has been found far superior to the horse serums, some samples being ten times as potent as the official control serum.

The length of time required for immunization of rabbits has been much less than that for horses.

Antimeningococcic serum can be prepared more quickly and conveniently in rabbits than in horses. When refined and concentrated it has a much higher protective value, when studied in the laboratory, than similar serum from horses.

REFERENCES

(1) Branham, S. E.: The effect of sulfapyridine and sulfanilamide with and without serum in experimental meningococcus infection. Pub. Health Rep., 55: 12–25 (Jan. 5, 1940).
(2) Branham, S. E., and Pittman, M.: A recommended procedure for the mouse protection test in evaluation of antimeningococcus serum. Pub. Health Rep., 55: 2340–2346 (Dec. 20, 1940).
(3) Horsfall, F. L., Goodner, K., and McLeod, C. M.: Type specific antipneumococcus rabbit serums. Science, 84: 579–581 (Dec. 25, 1936).
Horsfall, F. L., Goodner, K., McLeod, C. M., and Harris, H. M.: Antipneumococcus rabbit serum as a therapeutic agent in lobar pneumonia. J. Am. Med. Assoc., 108: 1483–1490 (May 1, 1937).
(4) Finland, M., Spring, W. C., Jr., and Lowell, F. C.: Specific treatment of the pneumococcic pneumonias; an analysis of the results of serum therapy and chemotherapy at the Boston City Hospital from July 1938 through June 1939. Ann. Int. Med., 13: 1567–1593 (March 1940).
Finland, M., Lowell, F. C., and Spring, W. C. Jr.: Clinical and laboratory studies on the use of serum and sulfapyridine in the treatment of the pneumococcal pneumonias. New Eng. J. Med., 222: 739–747 (May 2, 1940).
Finland, M., Lowell, F. C., and Strauss, E.: Some aspects of the chemotherapy of pneumonia. N. Y. State J. Med., 40: 1115–1122 (July 15, 1940).
Thompson, L. D., Edwards, J. C., and Hoagland, C. L.: Experiences in the treatment of lobar pneumonia. Ann. Int. Med., 13: 1138–1149 (January 1940).
Council on Pharmacy and Chemistry: Antipneumococcic serums. J. Am. Med. Assoc., 116: 2597 (June 7, 1941).
Finland, M.: Present status of higher types of antipneumococcus serums. J. Am. Med. Assoc., 120: 1294–1307 (Dec. 19, 1942).

LOCATION AND MOVEMENT OF PHYSICIANS, 1923 AND 1938—AGE DISTRIBUTION IN RELATION TO COUNTY CHARACTERISTICS [1]

By Joseph W. Mountin, *Assistant Surgeon General*, Elliott H. Pennell, *Statistician*, and Virginia Nicolay, *United States Public Health Service*

In estimating the professional resources of a community it is of course necessary to consider the age as well as the actual number of physicians in practice. However, an appraisal of a local situation may be misleading without having in mind the national pattern. This composite, in turn, has been controlled over the years by such factors as output of medical colleges and life expectancy.

Most influential of these two factors is the variation in numbers of medical graduates preceding as well as during the period embraced by

[1] From the States Relations Division. Assistance in the preparation of these materials was furnished by the personnel of Work Projects Administration Official Project No. 65-2-23-356.

This is the fourth report on the location and movement of physicians, 1923 and 1938. Previous articles are:

Mountin, Joseph W., Pennell, Elliott H., and Nicolay, Virginia: Location and movement of physicians, 1923 and 1938—general observations. Pub. Health Rep., 57:1363 (September 11, 1942). Reprint No. 2408.

Mountin, Joseph W., Pennell, Elliott H., and Nicolay, Virginia: Location and movement of physicians, 1923 and 1938—turnover as a factor affecting State totals. Pub. Health Rep., 57:1752 (November 20, 1942). Reprint No. 2422.

Mountin, Joseph W., Pennell, Elliott H., and Nicolay, Virginia: Location and movement of physicians, 1923 and 1938—effect of local factors upon location. Pub. Health Rep., 57:1945 (December 18, 1942). Reprint No. 2434.

this study, 1923 to 1938.[2] Leland, in a comprehensive report on physician distribution,[3] has presented statistics illustrating the trend in the output of medical colleges in the United States from 1880 to 1935. These data indicate a sharp increase from 3,241 graduates in 1880 to 5,214 in 1904, followed by a precipitous decline to 2,670 in 1918. This decline was coincident with many reforms in medical education. For the next 4 years the number remained at a low level, the lowest point being reached in 1922 when only 2,539 were graduated. As prospective students became adjusted to higher scholastic standards, the number of admissions to medical schools gradually rose. In close succession there followed correspondingly large but gradually diminishing annual increases in graduates until 1935 when the number reached 5,101. Material published in a late issue of the Journal of the American Medical Association[4] reveals that the numbers of graduates for each of the next 3 years were somewhat above the 1935 figure.

Naturally this marked variation in medical college output is reflected in the age distribution of physicians in both 1923 and 1938, the initial and terminal years of the study herein reported. If it may be assumed for purposes of calculation that the average age of 27 for medical graduates, as recorded by Leland, is roughly applicable at all periods, those physicians who were graduated prior to 1890 when the output of medical schools was relatively low would be 60 years of age or more in 1923. Others whose graduation had occurred between 1890 and 1910, when the output was high, would occupy a middle position in the age span. Finally, those who completed their schooling from 1910 to 1923—a second period of low production—would be, for the most part, under 40 years of age in 1923.

These disclosures explain the finding of heavy concentrations of physicians in the four 5-year age groups corresponding roughly to middle-aged physicians, with smaller totals for the 5-year age groups at the younger and older ages in the national picture for 1923 (fig. 1). The age pattern for 1938 was sharply in contrast with that for 1923. At this time, physicians surviving from the 1923 middle age groups had advanced into the higher age classifications, the unduly small number of young physicians plus some additional graduates not

[2] The data depicting age characteristics of physician groups presented in this report are available from a study of physician distribution and movement conducted by the U. S. Public Health Service with the assistance of a grant from the Work Projects Administration. The study was based upon data abstracted from American Medical Directories published by the American Medical Association over the period from 1923 to 1938. The study period represents the longest continuous series of directories available at the time the study was initiated. The age of a physician at the initial and terminal years of the study was indicated by his year of birth. The age distributions presented in this discussion represent summaries obtained from counts of physicians classified in 5-year intervals from year of birth.

[3] Leland, R. G.: Distribution of physicians in the United States. Bureau of Medical Economics, American Medical Association, Chicago, 1936.

[4] Schools, students, and graduates in the United States, 1904–1942. J. Am. Med. Assoc., 119:1281 (August 15, 1942).

listed in 1923 had advanced to the middle age category, and the young physicians in 1938 had been recruited from graduates in late years when the output of medical schools was large. This results in a strikingly large number of physicians in the young age groups, a very much smaller number in the 5-year age intervals describing the middle age groups, and a very large total in the oldest group.

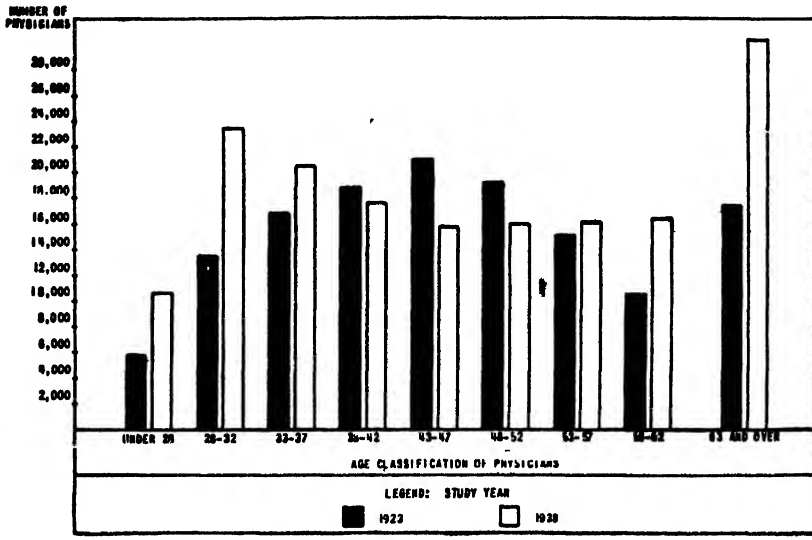


FIGURE 1.—Number of physicians in selected age groups, 1923 and 1938.

Worthy of mention in a consideration of age distribution is the mortality experience of physicians at different age levels. A gradually extending life expectancy of the general population in which physicians share with other groups assures professional resources through increased years of practice for individual physicians. Since the lengthening span of life is described by a fairly even gradient, the effect of this factor is quite uniform both in respect to time and locality.

In the presentation of data which follow, only three broad age intervals have been used to describe physician totals, namely, those under 38 years of age, others in the age interval 38 to 57, and physicians 58 years of age or older.[5] However, data for these three age groups present behavior patterns which closely parallel those shown by more detailed 5-year groups. There were large increases from 1923 to 1938 in the fraction of physicians in each of the three 5-year groups making up the first category. A large decline in the propor-

[5] The physician totals utilized in the determination of age distributions were based upon data tabulated from county summary figures showing total physicians in the county and their distribution by 5-year intervals from year of birth. Translation of these totals into corresponding age groups resulted in the somewhat unusual division-years used in this report.

tions of physicians in the age group 38 to 57 reflected the greatly diminished fractions in each of the four 5-year groups making up the group. Finally, the proportionate increase in physicians 58 years of age or older was evident for those 58 to 62 years of age and for others 63 and over. These national averages assume particular significance when the professional resources of communities are studied in relation thereto. If an unduly high proportion of physicians is in the advanced age brackets, rapid depletion is in prospect. Furthermore it is a well-known fact, supported by such statistics as are presented in a recent study by Ciocco and Altman[6] that the patient-load carried by physicians is reduced as physicians advance to the older age groups.

It may be recalled that discussion in previous papers of this series emphasized the importance of wealth as a factor in determining the availability of professional services in local areas. Data at hand indicate that differences in wealth as reflected by 1940 per capita income [7] effect considerable distortion in the age pattern of physicians residing in counties. As contrasted with the national average in 1923, the age distribution of physicians in poor counties reveals the fact

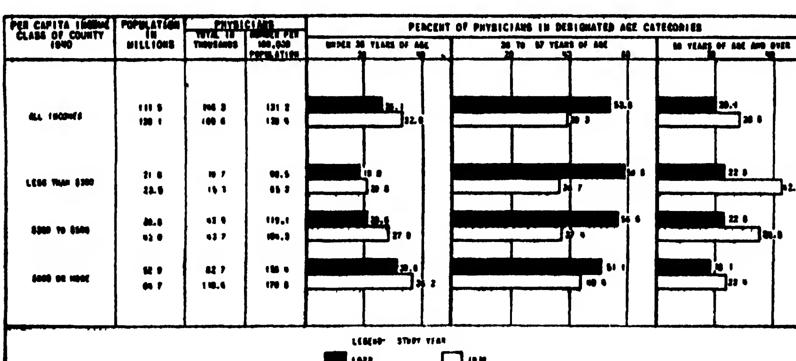


FIGURE 2.—Percent of physicians in counties of different income classification who were in selected age groups, 1923 and 1938.

that the fraction in the age group under 38 was hardly more than two-thirds as large as that which prevailed in the country as a whole (fig. 2). Balancing this low figure in the youngest age group the proportion in the middle and older age groups was slightly above those for all counties combined. Wealthy counties, on the other

[6] Ciocco, A., and Altman, I.: Statistics on the patient-load of physicians in private practice. J. Am. Med. Assoc., 121:506 (Feb. 13, 1943).

[7] In this study the 1940 per capita income figure used for classifying counties was obtained by dividing the effective buying income reported for the county in the April 10, 1941, issue of Sales Management by its population as revealed in the 1940 U. S. Census reports.

The classification of counties as poor, moderately wealthy, and wealthy is based upon an arbitrary division in terms of average per capita income. The first group includes those counties with average per capita incomes of less than $300, the next those with per capita incomes from $300 to $599, while the group referred to as wealthy realized incomes of $600 or more.

hand, realized a percentage of young physicians which was somewhat above that for the country as a whole, and the fractions in the middle and older age groups were slightly below the national average. In moderately wealthy counties the percentage of physicians in the three age groups occupied intermediate positions between those with low and those with high per capita incomes.

By the end of the 15-year period spectacular changes had taken place in the age distributions for all counties. At each of the three income levels for which county data are presented there were increases in the fraction of physicians who were under 38 and those 58 years of age or older. In the former age category the increase was only moderate, but the change in the fraction of older physicians, particularly in poor counties, was arresting. For counties with per capita incomes of less than $300 the proportion of physicians in the older age group increased from 23 to 42 percent, an increase from 23 to 35 percent occurred in this physician group in counties occupying intermediate positions on the income scale, while in wealthy counties the increase was only from 18 to 23 percent. The increased fractions of both young and old physicians were balanced by declines in the proportions in the middle age group.

The association between the number of graduates and the age composition of the physician group in subsequent periods was discussed early in this report for the country as a whole. Data presented in figure 2, however, clinch the fact that the changes which have taken place over the 15-year study period have most seriously affected poor counties. In these counties the provisions for professional care were especially meager in 1923, and by 1938 the number of physicians per 100,000 population had declined from 91 to 65. This was the result of a relatively large numerical loss in the total number of physicians located in these counties. Coupled with this loss of nearly one-fourth in the physician-population ratio, the shift to the older age group becomes particularly noteworthy. The proportion of physicians in this group (58 years of age or older) exceeded by one-half the national average in 1938. A condition such as this suggests the need for an energetic replacement program if these limited professional resources are to be maintained or augmented. It is highly probable that the losses through death will be accelerated in subsequent years because of the increasingly large fraction of physicians in that age category where high death rates may be expected.

In wealthy counties, on the other hand, the provisions for professional service at the onset of the study period were much more generous than in poor counties, and there was a numerical increase of nearly 30,000 physicians by 1938. The particularly favorable situation of these counties is indicated by the data which show that

nearly two-thirds of the physicians but only one-half of the population were located in wealthy counties in 1938. These counties *realized much larger proportions of young physicians* and much smaller *proportions in the group 58 years of age and over than did any other* income classification of county.

It is a common belief that the opportunities found in urban centers are both numerous and propitious. This attractiveness of urban counties [8] to physicians in their selection of locality for medical practice is reflected in the ratios of physicians to population in such counties as contrasted with rural counties. In 1923 there were 159 physicians per 100,000 persons in counties with cities of 50,000 or more inhabitants, while rural counties reported only 92 physicians per 100,000 persons (fig. 3). By 1938 the contrast in favor of urban

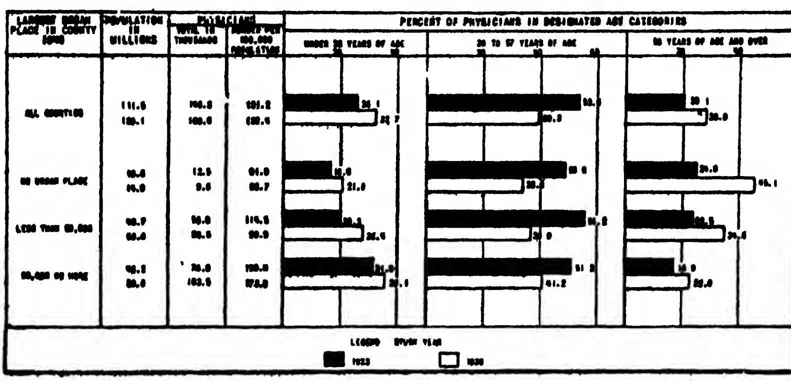


FIGURE 3.—Percent of physicians in counties of different urban classification who were in selected age groups, 1923 and 1938.

counties was even more enhanced through an increase in the ratio to 174 in these places and a decline to 69 in rural counties. In urban counties nearly one-third of all physicians were in the youngest age group, about one-half were from 38 to 57 years of age, and one-sixth were over 57 years old. Age distributions in rural counties were much less favorable. The age of physicians establishing locations in these counties prior to 1923 resulted in a distribution showing only one-sixth under 38 years of age, about three-fifths in the middle age group, and one-fourth over 57 years of age. Data for counties with urban places of less than 50,000 inhabitants revealed intermediate fractions of physicians in each age group.

The change in the age distribution pattern of physicians over the study period was relatively small in urban as contrasted with rural counties. The proportions in the three age groups for urban counties

[8] The urban character of a county was determined on the basis of the largest urban place located therein as revealed in the 1940 U. S. Census. As a result all comparisons between 1923 and 1938 for a given income class of county are based upon data for identical counties.

also were more favorable insofar as they reflected above-average proportions of young physicians and below-average fractions in the higher age category. Rural counties, on the other hand, registered only a small proportionate gain in young physicians. A large decline occurred in the middle age which was balanced for the most part by a large gain in physicians over 57 years of age. The percentage of physicians in the oldest group in rural counties actually increased from 25 percent in the early year to 45 percent in 1938.

Because of the physician's desire for continued association with a hospital after completing his internship, the presence of these institutions is significant in determining the availability of professional services. Counties with relatively numerous hospital beds in 1923 realized 153 physicians per 100,000 persons, as contrasted with 94 physicians in places with no hospital beds. Data presented in figure 4 reveal the important contribution of relatively generous hospital facilities [9] upon the age distribution of physicians. In 1923 the percentage of young physicians enlarged greatly as county classification revealed expanded hospital facilities, while the proportions in the middle and older age groups showed consistent declines.

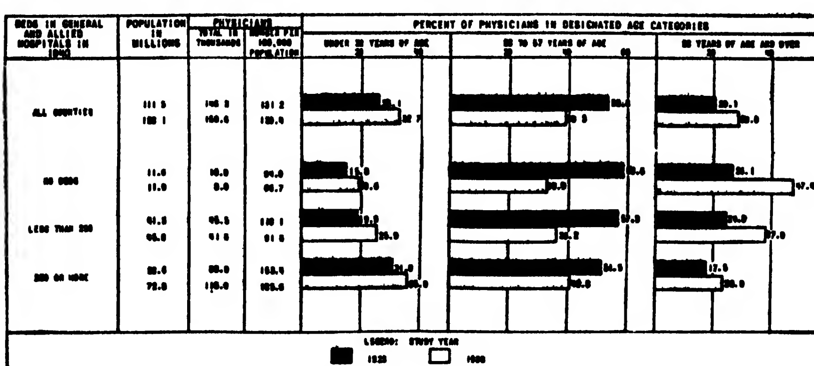


FIGURE 4.—Percent of physicians in counties with different hospital facilities who were in selected age groups, 1923 and 1938.

By the end of the 15-year period the distribution of physicians had been greatly altered. In counties with no beds the physician-population ratio had markedly declined while some increase was evident in those counties where hospital beds were relatively numerous. In each classification of hospital facilities the fraction of young physicians was greater than the corresponding figure for 1923. While as a general rule an increase or decrease in the proportion of physicians in any particular age group would represent a corresponding change in

[9] The amount of hospital facilities in a county was determined on the basis of data published in 1940 by the U. S. Department of Commerce. As a result all comparisons between 1923 and 1938 for a given group of counties are based upon data for identical counties.

the number of physicians, exception exists in counties without hospital facilities. Actually, the total number of young physicians in these counties declined from 1,524 to 1,502. In the intermediate age group the percentage of physicians varied from 33 in counties with no hospital beds to 41 in counties having generous accommodations for medical care. In contrast, the proportion of physicians in the group 58 years of age and over tended to expand in counties with no hospital beds or limited accommodations. The percentage of these physicians in 1938 was 47 in counties with no beds; counties with generous hospital facilities realized less than half as great a proportion.

The comparisons presented on the basis of urban character and hospital facilities are somewhat modified when income differences are taken into account, and this influence of income is consistent throughout the several comparisons. Both in rural counties and in counties without hospital facilities, high per capita income is reflected by much more favorable fractions of young physicians than are manifest in these counties when income is low. In a similar fashion but at a consistently higher level did income differences affect physician distribution in highly urbanized counties and in those with generous hospital facilities.

SUMMARY

Annual per capita income of residents of communities not only reflects itself in the number of physicians located therein, but also in the age distribution of these physicians. Physician-population ratios were higher and the fractions of young physicians were greater in wealthy than in poor counties. This favored status of wealthy counties was enhanced by the end of the study period, while provisions for care in poor counties revealed a severe decline and an unfavorable shift to the higher age classification.

Investigation reveals a strong tendency for physicians, particularly those graduating in recent years, to establish medical practice in urban places. Rural counties not only realized fewer physicians but failed to maintain throughout the period a number as great as that describing the physician totals in 1923.

Physician-population ratios and also the fraction of young physicians were lowest in counties without hospitals. In contrast, those counties with the most liberal provisions for hospital service realized the most abundant share of physicians in 1923, and the additions to their physician totals throughout the study period resulted in considerable expansion by 1938.

While the amount of hospital facilities, degree of urbanization, and level of income in counties are intimately related, each in isolation would appear to exercise a significant influence upon the age distribution of physicians.

AMBLYOMMA AMERICANUM A VECTOR OF ROCKY MOUNTAIN SPOTTED FEVER

Recovery of the rickettsia of Rocky Mountain spotted fever from nymphs of the tick *Amblyomma americanum* has been reported by R. R. Parker, G. M. Kohls, and E. A. Steinhaus of the Rocky Mountain Laboratory of the National Institute of Health. The nymphs, 114 in number, were collected September 11, 1942, at Weathers, Okla., from vegetation in close proximity to the home of a patient convalescing from spotted fever.

For the past decade *A. americanum* has been suspected of being a vector of Rocky Mountain spotted fever, but this finding of the rickettsia is proof that *A. americanum* is infected in nature with the causative agent of the disease.

PREVALENCE OF MENINGOCOCCUS MENINGITIS IN THE UNITED STATES DURING 1942 AND FIRST 9 WEEKS OF 1943

During the latter part of 1942 and the early weeks of 1943, the reported incidence of meningococcus meningitis has approached the epidemic proportions of 1929. In the early summer of 1942, in the weekly summaries of reports of the important communicable diseases published in the PUBLIC HEALTH REPORTS, attention was called to the fact that the incidence of the disease each week was exceeding the 5-year (1937–41) median. This excess incidence began during February and continued throughout the remainder of the year. In some of the weeks of November the numbers of reported cases were twice the 5-year median expectancy, in December they were about three times the median, while in January and February they were four to nine times the median figures. In 1942 a total of 3,774 cases was reported in the United States. (These figures are based on the weekly telegraphic reports and are preliminary, but will probably closely approximate the final figures.) To March 13, 1943, a total of 4,040 cases has been reported.

Following are the numbers of cases reported by weeks during the current year up to and including the week ended March 13:

	Week ended—										
	January					February				March	
	2	9	16	23	30	6	13	20	27	6	13
Number of cases	187	278	309	354	339	330	[1] 446	398	[2] 503	[3] 556	525

[1] Including 43 delayed reports from Virginia.
[2] Including 19 delayed reports from Virginia.
[3] Including 15 delayed reports from Virgina and 10 from Arizona.

The highest incidence rates so far this year have apparently been in the New England, South Atlantic, and Pacific States. The largest numbers of cases are being reported from the South Atlantic, Middle Atlantic, Pacific, and New England areas.

The accompanying tables show the incidence, by principal geographic divisions and States, for the first 9 weeks of 1942 (to March 6) and the numbers of cases and deaths reported each year in the United States, with case and death rates, beginning with 1929, the year in which the highest rates were recorded since 1918.[1]

Total cases of meningococcus meningitis reported, by geographic divisions and States, during the first 9 weeks of 1943 (Jan. 3–Mar. 6)

Geographic division and State	Cases	Percent of total cases	Percent of total population[1]
New England	452	12 9	6.4
Maine	108		
New Hampshire	7		
Vermont	3		
Massachusetts	121		
Rhode Island	178		
Connecticut	35		
Middle Atlantic	704	20 0	20 5
New York	353		
New Jersey	167		
Pennsylvania	184		
East North Central	299	8.5	20 6
Ohio	53		
Indiana	49		
Illinois	80		
Michigan	61		
Wisconsin	56		
West North Central	244	6 9	9 9
Minnesota	18		
Iowa	8		
Missouri	137		
North Dakota	3		
South Dakota	6		
Nebraska	20		
Kansas	52		
South Atlantic	726	20 7	13 8
Delaware	5		
Maryland	136		
Dist of Col	28		
Virginia	272		
West Virginia	16		
South Atlantic—Con.			
North Carolina	89		
South Carolina	115		
Georgia	27		
Florida	38		
East South Central	255	7.3	8 2
Kentucky	49		
Tennessee	52		
Alabama	88		
Mississippi	66		
West South Central	193	5 5	9 9
Arkansas	22		
Louisiana	62		
Oklahoma	15		
Texas	94		
Mountain	132	3.8	3 0
Montana	4		
Idaho	11		
Wyoming	11		
Colorado	15		
New Mexico	9		
Arizona	26		
Utah	46		
Nevada	10		
Pacific	510	14 5	7 6
Washington	113		
Oregon	126		
California	271		
Total	3,515		

[1] Estimated population, 1942.

Number of cases of meningococcus meningitis and deaths from the same cause, with rates per 100,000 population, reported in the United States, 1929 to 1942

Year	Number of States reporting	Cases	Cases per 100,000 population	Deaths	Deaths per 100,000 population
1929	46	10,551	8 7	5,171	4 5
1930	44	8,384	7.0	4,171	3 6
1931	40	5,426	4 7	2,806	2.4
1932	41	3,102	2.8	1,651	1 4
1933	44	2,913	2.4	1,482	1 2
1934	45	2,500	2 0	1,272	1 0
1935	43	5,736	4 7	2,657	2.1
1936	44	7,320	5 9	3,020	2.4
1937	44	5,484	4.3	2,208	1.7
1938	47	2,919	2.3	1,024	.8
1939	47	1,993	1.5	863	.7
1940	48	1,665	1.3	694	.5
1941	48	2,039	1 5	713	.5
1942	48	[1] 3 774	2.9	(2)	(2)

[1] Preliminary reports. [2] Not available.

Cases are those reported to the Public Health Service.
Deaths and death rates are taken from Bureau of the Census publications.

[1] See also pp. 494 and 496.

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

January 31–February 27, 1943

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4-week period ended February 27, 1943, the number reported for the corresponding period in 1942, and the median number for the years 1938–42.

DISEASES ABOVE MEDIAN PREVALENCE

Meningococcus meningitis.—The number of cases of meningococcus meningitis rose from 1,267 for the preceding 4-week period to 1,679 during the 4 weeks ended February 27. The current figure was about six times that recorded for 1942 and more than seven times the 1938–42 median incidence for the corresponding period. For the country as a whole the number of cases was the largest reported during this period in the 15 years for which these data are available.

Each geographic region reported a very significant increase over the corresponding period in 1942 and also over the 5-year median incidence. The greatest increases were reported from the New England and Pacific regions. In the former area the number of cases (203) was about seventeen times the median, while in the latter area the number (222) was more than eighteen times the median. In the North Central and South Atlantic regions the numbers of cases were approximately eight times the median figures and in other regions the increases ranged from three to seven times the normal seasonal expectancy.

The table shows by geographic regions the number of cases reported for recent weeks in comparison with the experience of the 2 preceding years. While the incidence of meningococcus meningitis was relatively high throughout the year 1942, the data show a sharp upturn during the month of December and the weekly number of cases has continued to increase since that time, the figures in each region being the highest in the 3 years included. With the exception of the Mountain region the current incidence is the highest in all regions since 1930.

Meningococcus meningitis cases reported in each geographic region during recent weeks of 1942–43, with comparative data for corresponding weeks of the two preceding years

Division	Week ended—													
	1942				1943									
	Dec. 5	Dec 12	Dec 19	Dec 26	Jan. 2	Jan. 9	Jan 16	Jan 23	Jan 30	Feb 6	Feb 13	Feb. 20	Feb 27	Mar 6
All regions.														
1942–43	88	103	103	92	187	278	309	354	339	330	446	398	503	556
1941–42	35	43	28	37	47	45	68	52	65	60	42	84	87	70
1940–41	22	34	31	28	28	41	38	61	53	48	46	46	44	56
New England														
1942–43	16	19	13	13	23	35	55	46	50	42	49	60	52	61
1941–42	6	3	3	7	2	8	7	2	6	5	5	5	14	17
1940–41	1	2	4	2	2	4	0	1	3	1	3	3	3	2
Middle Atlantic														
1942–43	27	26	30	16	37	54	47	68	57	67	94	92	108	117
1941–42	9	6	9	9	9	12	10	8	19	17	10	18	16	14
1940–41	3	4	5	2	2	6	12	9	9	7	13	13	8	11
East North Central														
1942–43	6	8	12	13	21	21	10	34	39	38	26	46	41	44
1941–42	4	6	2	4	1	5	9	3	4	5	5	3	7	4
1940–41	2	8	3	3	3	7	3	7	3	5	4	4	2	8
West North Central														
1942–43	3	2	4	3	12	19	35	21	24	27	19	22	34	43
1941–42	3	6	3	1	3	4	3	2	2	3	3	1	4	2
1940–41	2	1	5	3	3	0	4	3	0	6	3	3	1	5
South Atlantic:														
1942–43	14	20	21	27	29	65	57	68	68	71	116	72	[1] 104	[2] 105
1941–42	6	7	2	6	10	7	15	12	19	13	7	17	20	14
1940–41	5	4	6	6	6	10	2	19	19	5	7	7	17	10
East South Central														
1942–43	4	3	0	1	12	15	21	24	22	16	35	13	64	45
1941–42	4	6	6	3	6	2	6	4	7	7	3	3	10	3
1940–41	2	6	3	6	6	6	4	7	10	14	12	12	8	9
West South Central														
1942–43	5	3	6	3	6	14	14	23	21	16	3	18	29	27
1941–42	8	4	2	4	8	2	8	11	3	7	4	31	10	8
1940–41	3	6	3	4	4	4	7	10	8	7	2	2	1	8
Mountain														
1942–43	5	4	4	4	19	18	10	16	10	7	17	11	18	[3] 25
1941–42	0	2	0	1	3	1	4	1	1	2	1	2	3	1
1940–41	0	0	0	0	0	1	0	1	0	0	1	1	2	0
Pacific														
1942–43	8	18	13	12	28	37	60	54	48	46	59	64	53	89
1941–42	0	3	1	2	1	4	6	9	4	1	4	4	3	7
1940–41	4	3	2	2	2	3	6	4	1	3	1	1	2	3

[1] Delayed report of 19 cases in Virginia included.
[2] Delayed report of 15 cases in Virginia included.
[3] Delayed report of 10 cases in Arizona included.

States in the various regions reporting the largest number of cases in comparison with preceding years were New York, 167; New Jersey, 102; Pennsylvania, 92; Rhode Island, 87; Maine, 43; Virginia, 154; Maryland, 56; Texas, 58; California, 124; Oregon, 50; and North Carolina, South Carolina, Alabama, Illinois, and Washington approximately 45 cases each.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—For the 4 weeks ended February 27 there were 1,125 cases of diphtheria reported, as compared with 1,116 in 1942 and a median of 1,365 cases recorded for the corresponding period in 1938–42. In the Mountain and Pacific regions the incidence was slightly higher than the normal seasonal expectancy, but all other regions reported a relatively low incidence.

Influenza.—The number of cases of influenza was also comparatively low, approximately 19,000 cases, as compared with approximately 22,000 cases in 1942, which figure also represents the 1938–42 median incidence for the corresponding period. In each section of the country the incidence was below the normal seasonal level.

Measles.—The number of cases of this disease rose from approximately 36,000 cases during the preceding 4 weeks to 59,483 cases during the current 4-week period. Compared with recent years the number of cases reported for the country as a whole was slightly lower than the 1938–42 median incidence. The distribution among the geographic regions was not so favorable, however, for in all regions except the West North Central and South Atlantic the disease was considerably above the normal expectancy.

Poliomyelitis.—The incidence of poliomyelitis was about normal, 97 cases being reported, as compared with 101 cases for the corresponding period in 1942. The 1938–42 median for this period was also 101 cases. Significant increases over the median were reported from the West North Central, Mountain, and Pacific regions, while in other regions the number of cases either closely approximated the median or fell below it.

Scarlet fever.—While the number (16,261) of cases of scarlet fever was slightly above the number reported during the corresponding period in 1942, it was only about 85 percent of the 1938–42 median number for the same 4-week period. The disease was relatively high in the New England, South Atlantic, West South Central, and Mountain regions, but all other regions reported a decline from the normal seasonal incidence, the largest decreases being reported from the Middle Atlantic and East North Central regions.

Smallpox.—A total of 104 cases of smallpox was reported for the current period, as compared with 87 cases in 1942 and with a 5-year (1938–42) median of 257 cases. Of the total cases, Indiana reported 31, Arkansas 17, Texas 13, Kansas 8, Oklahoma 6, and Illinois 5. No more than 4 cases were reported from any other State. The current incidence was slightly above the all-time low level recorded for this period in 1942 (87 cases).

Typhoid and paratyphoid fever.—For the 4 weeks ended February 27 there were 208 cases of this disease reported, as compared with 330, 248, and 292 cases for the corresponding periods in 1942, 1941, and 1940, respectively, and with a 1938–42 median incidence of 330 cases. For the country as a whole the current incidence is the lowest on record for this period. Each section of the country shares in the favorable situation of this disease that now exists.

Number of reported cases of 9 communicable diseases in the United States during the 4-week period January 31–February 27, 1943, the number for the corresponding period in 1942, and the median number of cases reported for the corresponding period 1938–42

Division	Current period	1942	5-year median	Current period	1942	5-year median	Current period	1942	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	1,125	1,116	1,565	18,933	22,139	22,139	59,483	61,149	61,149
New England	18	23	23	32	29	76	5,731	4,084	3,191
Middle Atlantic	116	173	265	118	137	285	21,714	7,860	7,860
East North Central	133	163	304	477	495	5,016	6,603	4,209	5,799
West North Central	97	76	106	235	209	833	4,196	5,732	5,732
South Atlantic	163	237	266	6,738	6,557	9,184	2,476	12,552	9,968
East South Central	106	104	139	1,372	2,825	2,825	3,578	1,269	1,494
West South Central	247	218	286	7,853	9,254	9,254	2,785	10,565	2,117
Mountain	89	62	86	1,566	1,909	1,999	5,233	3,209	2,628
Pacific	156	60	115	542	634	675	7,167	11,669	5,804
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	1,677	273	227	97	101	101	16,261	16,160	19,277
New England	203	29	17	0	9	2	2,602	1,835	1,539
Middle Atlantic	361	61	51	8	19	7	3,798	3,945	5,100
East North Central	151	20	19	9	17	17	4,179	4,801	6,368
West North Central	102	11	13	12	2	4	1,602	1,880	1,880
South Atlantic	363	57	45	16	11	17	1,159	1,293	1,087
East South Central	128	23	43	9	14	14	596	687	687
West South Central	94	52	22	11	13	11	452	383	439
Mountain	53	8	9	11	7	6	1,008	647	647
Pacific	222	12	12	21	9	10	865	689	990
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	104	87	257	208	330	330	15,061	15,121	15,898
New England	0	0	0	7	19	16	1,293	1,758	1,256
Middle Atlantic	0	0	0	33	46	46	3,307	3,652'	3,652
East North Central	41	8	72	28	39	44	3,549	3,625	3,151
West North Central	17	15	102	11	15	18	729	666	669
South Atlantic	2	3	3	43	132	74	2,001	1,981	2,347
East South Central	4	22	22	21	26	30	587	580	580
West South Central	36	36	38	38	37	50	1,856	610	610
Mountain	4	2	67	11	5	14	469	769	769
Pacific	0	1	11	16	11	23	1,270	1,477	1,477

[1] Mississippi, New York, and Pennsylvania excluded, New York City included.
[2] Mississippi excluded

Whooping cough.—The incidence of whooping cough was comparatively low, the current incidence (15,061 cases) being slightly below the number reported during this period in 1942 and also below the 1938–42 median figure. In the New England, North Central, and South Central regions the disease was more prevalent than in recent years, but in the Middle and South Atlantic, Mountain, and Pacific regions the numbers of cases were below the expectancy.

MORTALITY, ALL CAUSES

The number of deaths from all causes in large cities for the 4 weeks ended February 27, based on data received from the Bureau of the Census, was 40,270, as compared with an average of 37,738 cases for the corresponding period in the years 1940–42—an increase of approximately 6 percent.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 13, 1943

Summary

Although current reports show increases over figures for the preceding week for influenza, measles, poliomyelitis, scarlet fever, and smallpox, reports of the nine common communicable diseases included in the following table show the incidence of only measles, meningococcus meningitis, and poliomyelitis to be above the corresponding 5-year (1938–42) medians.

A total of 525 cases of meningococcus meningitis was reported for the current week, as compared with 531 for the preceding week. The accumulated total for the first 10 weeks of the year is 4,040. The peak of incidence of this disease was reached before the end of March in 9 of the past 16 years, during April in 5, and as late as May in 2 of those years. For the current week, increases were shown in only the East North Central, East South Central, and West South Central groups of States. States reporting the largest numbers were New York (57), California (36), Massachusetts (29), Virginia (29), Pennsylvania (26), Texas (23), and New Jersey (21).

Other reports for the week include the following: Dysentery, 441 cases; infectious encephalitis, 14; leprosy, 1; tularemia, 21; and endemic typhus fever, 32.

During the current week 10,105 deaths were recorded in 90 large cities of the United States as compared with 9,725 for the preceding week and with an average of 9,251 for the corresponding weeks of the 3 preceding years. The accumulated figure for the first 10 weeks of the current year is 101,721, as compared with 93,632 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended March 13, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median, 1938–42	Week ended		Median, 1938–42	Week ended		Median, 1938–42	Week ended		Median, 1938–42
	Mar. 13, 1943	Mar. 14, 1942		Mar. 13, 1943	Mar. 14, 1942		Mar. 13, 1943	Mar. 14, 1942		Mar. 13, 1943	Mar. 14, 1942	
NEW ENG.												
Maine	0	0	1	2	------	6	3	205	205	7	2	1
New Hampshire	0	1	0	------	------	------	18	21	26	0	1	0
Vermont	0	0	0	------	------	------	372	9	17	1	0	0
Massachusetts	0	5	4	------	------	------	1,243	615	594	29	7	1
Rhode Island	0	0	0	17	------	------	38	210	9	11	0	0
Connecticut	0	0	1	3	2	9	443	307	238	8	0	0
MID. ATL.												
New York	19	28	28	[1] 12	[1] 12	[1] 40	1,941	578	1,482	57	12	7
New Jersey	3	3	7	9	14	19	1,417	384	384	21	4	1
Pennsylvania	4	10	35	2	------	------	2,709	925	925	26	3	5
E. NO. CEN.												
Ohio	10	9	17	7	21	21	450	299	299	11	4	2
Indiana	5	4	12	1	32	52	342	71	71	8	2	1
Illinois	14	16	23	34	8	34	887	505	505	16	1	2
Michigan [2]	5	5	7	8	32	28	630	248	373	12	2	1
Wisconsin	1	2	2	41	44	175	1,053	719	781	11	0	0
W. NO. CEN.												
Minnesota	5	1	1	------	1	6	45	823	240	5	0	0
Iowa	2	3	4	1	13	28	329	323	290	0	0	0
Missouri	2	2	7	7	8	22	467	465	86	15	0	0
North Dakota	0	1	1	------	9	30	102	128	9	0	0	0
South Dakota	3	4	1	------	------	1	152	5	5	3	0	0
Nebraska	3	2	2	3	48	14	292	167	33	1	0	1
Kansas	4	8	4	17	21	21	374	460	460	1	2	1
SO. ATL.												
Delaware	0	0	0	------	------	------	54	7	7	2	0	0
Maryland [3]	6	2	2	10	20	53	73	611	104	18	3	1
District of Columbia	0	0	1	1	2	2	72	51	30	2	2	1
Virginia	10	12	12	696	637	1,016	650	282	401	29	10	2
West Virginia	1	6	8	9	40	71	13	443	338	6	2	2
North Carolina	3	5	14	137	16	116	58	1,459	1,088	16	0	1
South Carolina	1	3	4	1,017	705	766	59	225	194	13	3	2
Georgia	1	5	5	181	119	267	108	320	320	9	0	0
Florida	1	0	5	3	10	10	48	207	207	10	1	1
E. SO. CEN.												
Kentucky	4	10	9	12	20	80	1,433	73	102	15	2	1
Tennessee	8	5	5	155	123	261	330	118	118	17	2	1
Alabama	6	6	9	212	354	401	132	110	279	10	1	1
Mississippi [3]	4	70	5	------	------	------	------	------	------	12	1	1
W. SO. CEN.												
Arkansas	4	7	7	94	280	501	72	353	152	2	0	0
Louisiana	2	4	7	11	27	42	206	136	21	13	1	2
Oklahoma	3	8	7	49	94	253	86	515	83	7	1	1
Texas	40	57	38	1,653	1,712	1,167	1,261	2,815	745	23	13	2
MOUNTAIN												
Montana	0	0	2	14	38	19	204	80	80	2	1	0
Idaho	0	0	0	3	------	2	139	85	58	3	0	0
Wyoming	0	0	0	14	197	8	192	59	39	0	0	0
Colorado	6	6	12	42	88	61	622	256	213	2	0	0
New Mexico	1	2	1	2	3	4	13	118	89	0	0	0
Arizona	2	0	2	123	182	182	47	170	42	1	0	0
Utah [3]	0	1	1	29	4	8	357	178	178	5	0	0
Nevada	0	0	------	------	------	------	25	18	------	7	0	------
PACIFIC												
Washington	2	3	8	------	7	3	845	253	253	14	2	0
Oregon	0	1	1	27	10	42	434	97	97	8	0	0
California	16	23	23	86	148	148	721	4,867	417	36	3	3
Total	201	340	348	4,744	5,101	7,725	21,511	21,373	21,373	525	88	55
10 weeks	2,951	3,249	4,064	45,417	49,622	69,182	136,443	136,092	136,092	4,040	661	533

See footnotes at end of table.

***Telegraphic morbidity reports from State health officers for the week ended March 13, 1943, and comparison with corresponding week of 1942 and 5-year median*—Con.**

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42
	Mar. 13, 1943	Mar. 14, 1942		Mar. 13, 1943	Mar. 14, 1942		Mar. 13, 1943	Mar. 14, 1942		Mar. 13, 1943	Mar. 14, 1942	
NEW ENG.												
Maine	0	0	0	18	30	17	0	0	0	0	3	0
New Hampshire	0	0	0	5	58	9	0	0	0	0	0	0
Vermont	0	0	0	5	3	15	0	0	0	0	0	0
Massachusetts	2	0	0	439	381	219	0	0	0	0	0	1
Rhode Island	0	0	0	28	15	15	0	0	0	0	0	0
Connecticut	0	0	0	81	49	69	0	0	0	2	1	1
MID. ATL.												
New York	0	1	1	491	536	747	0	0	0	5	4	4
New Jersey	0	1	0	161	208	208	0	0	0	0	2	3
Pennsylvania	2	1	1	346	649	649	0	0	0	2	7	7
E. NO. CEN.												
Ohio	2	2	0	248	758	471	4	0	0	2	8	4
Indiana	0	0	0	114	127	161	4	0	2	1	1	1
Illinois	0	1	1	218	289	543	1	4	4	0	0	3
Michigan [2]	0	1	0	192	359	359	0	0	0	3	0	5
Wisconsin	0	0	0	323	170	170	0	1	3	0	0	0
W. NO. CEN.												
Minnesota	0	1	0	87	110	110	0	0	7	0	0	0
Iowa	1	0	0	67	58	65	0	0	5	1	1	1
Missouri	0	0	0	148	123	123	0	1	8	0	1	2
North Dakota	0	0	0	16	26	14	0	0	0	0	0	0
South Dakota	0	0	0	22	41	26	1	1	1	0	0	0
Nebraska	1	0	0	40	34	34	2	0	1	1	0	0
Kansas	0	0	0	90	130	127	0	1	1	1	0	0
SO. ATL.												
Delaware	0	0	0	14	58	13	0	0	0	0	0	0
Maryland [3]	0	0	0	88	70	57	0	0	0	6	0	0
District of Columbia	0	0	0	15	16	24	0	0	0	0	0	0
Virginia	0	0	0	53	50	36	0	0	0	1	0	3
West Virginia	0	0	0	25	48	48	0	0	0	0	1	3
North Carolina	0	0	0	35	43	57	0	0	0	2	1	1
South Carolina	3	3	0	10	2	5	0	2	0	1	0	0
Georgia	0	0	0	15	22	22	0	0	0	0	5	2
Florida	0	0	0	6	10	10	0	0	0	2	6	3
E. SO. CEN.												
Kentucky	0	1	1	57	98	98	0	1	1	0	1	3
Tennessee	0	2	0	53	38	49	0	0	0	2	1	1
Alabama	1	0	1	11	22	19	0	0	0	2	1	1
Mississippi [2]	0	0	0	22	15	7	0	0	0	1	0	1
W. SO. CEN.												
Arkansas	0	0	0	5	10	10	2	0	2	2	3	3
Louisiana	1	0	0	13	0	14	0	0	0	0	3	3
Oklahoma	0	0	0	28	5	22	2	1	16	1	0	1
Texas	1	0	0	76	49	58	1	1	2	3	2	3
MOUNTAIN												
Montana	0	0	0	13	19	40	0	2	0	0	0	0
Idaho	0	0	0	8	2	15	0	0	1	0	0	0
Wyoming	0	0	0	45	23	11	0	0	0	0	0	0
Colorado	0	1	0	21	49	44	0	1	2	1	0	0
New Mexico	1	0	0	0	9	11	0	0	0	0	0	0
Arizona	3	1	0	17	2	4	1	0	0	0	1	1
Utah [2]	1	0	0	64	27	27	0	0	0	0	1	1
Nevada	0	0	------	4	2	------	0	0	----	0	0	------
PACIFIC												
Washington	2	0	0	39	33	35	0	0	0	0	1	1
Oregon	1	1	1	6	11	23	1	0	2	2	2	2
California	7	1	1	197	149	156	0	0	5	9	1	3
Total	29	18	17	4,079	5,036	5,036	19	16	94	53	58	104
10 weeks	278	250	250	38,233	39,658	45,937	266	206	734	518	779	779

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 13, 1943, and comparison with corresponding week of 1942 and 5-pear median—Con.

Division and State	Whooping cough: Week ended Mar. 13, 1943	Whooping cough: Week ended Mar. 14, 1942	Whooping cough: Median 1938–42	Week ended Mar. 13, 1943: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt spotted fever	Tularemia	Typhus fever
NEW ENG.												
Maine	51	30	53	0	0	0	0	0	0	0	0	0
New Hampshire	1	6	6	0	0	0	0	0	0	0	0	0
Vermont	35	34	25	0	0	0	0	0	0	0	0	0
Massachusetts	197	235	187	0	0	1	0	0	0	0	0	0
Rhode Island	38	43	29	0	0	0	0	0	0	0	0	0
Connecticut	49	82	76	0	0	1	0	0	0	0	0	0
MID. ATL.												
New York	417	487	451	0	26	2	0	3	0	0	0	1
New Jersey	244	243	219	0	0	0	0	1	0	0	0	0
Pennsylvania	314	211	320	0	0	0	0	0	0	0	0	0
E. NO. CEN.												
Ohio	150	341	188	0	0	0	0	2	0	0	1	0
Indiana	36	27	27	0	0	0	0	0	0	0	0	0
Illinois	139	146	138	0	0	1	0	2	0	0	0	0
Michigan [2]	295	164	206	0	0	4	0	0	0	0	0	0
Wisconsin	225	189	145	0	0	0	0	0	0	0	0	0
W. NO. CEN.												
Minnesota	89	59	55	0	1	0	0	0	0	0	0	0
Iowa	23	55	25	0	0	0	0	0	0	0	0	0
Missouri	14	22	27	0	0	0	0	0	0	0	1	0
North Dakota	10	5	8	0	0	0	0	0	0	0	0	0
South Dakota	1	6	6	0	0	0	0	0	0	0	0	0
Nebraska	6	8	8	0	0	0	0	0	0	0	0	0
Kansas	35	55	55	0	0	0	0	1	0	0	1	0
SO. ATL.												
Delaware	2	0	3	0	0	0	0	0	0	0	0	0
Maryland [2]	98	45	45	0	0	1	0	0	0	[3] 1	0	0
Dist. of Col.	26	26	24	0	0	0	0	0	0	0	0	0
Virginia	95	74	74	0	0	0	40	0	0	0	1	0
West Virginia	31	41	50	0	0	0	0	0	0	0	0	0
North Carolina	125	100	272	0	0	0	0	0	0	0	0	0
South Carolina	48	80	80	0	0	7	0	0	0	0	0	1
Georgia	28	33	38	0	1	0	0	0	0	0	5	14
Florida	14	40	14	0	0	0	0	0	0	0	0	2
E. SO. CEN.												
Kentucky	32	76	50	0	0	5	0	0	0	0	0	0
Tennessee	106	34	36	0	0	0	1	0	0	0	7	0
Alabama	37	22	22	0	0	0	0	0	0	0	2	3
Mississippi [2]	----	------	----	0	0	0	0	0	0	0	2	0
W. SO. CEN.												
Arkansas	20	19	19	0	0	0	0	0	0	0	0	0
Louisiana	1	10	10	0	1	0	0	1	0	0	0	2
Oklahoma	25	9	9	0	0	0	0	0	0	0	0	0
Texas	383	217	217	0	56	259	0	1	0	0	0	6
MOUNTAIN												
Montana	10	6	6	0	1	0	0	0	0	0	0	0
Idaho	0	19	5	0	0	0	0	0	0	0	0	0
Wyoming	0	3	3	0	0	0	0	0	0	0	1	0
Colorado	22	55	45	0	0	0	0	1	1	0	0	0
New Mexico	17	59	24	0	0	0	0	0	0	0	0	0
Arizona	12	20	42	0	0	0	25	0	0	0	0	0
Utah [2]	37	69	69	0	0	0	0	0	0	0	0	0
Nevada	6	8	------	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	31	89	78	0	0	0	0	0	0	0	0	0
Oregon	5	37	16	0	0	0	0	0	0	0	0	0
California	331	277	277	0	2	6	0	2	0	0	0	3
Total	3,911	3,916	4,232	0	88	287	66	14	1	1	21	32
10 weeks	38,789	40,078	40,631									

[1] New York City only. [2] Period ended earlier than Saturday. [3] Delayed report.

WEEKLY REPORTS FROM CITIES

City reports for week ended February 27, 1943

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga	0	0	31	2	11	0	0	0	11	0	0	3
Baltimore, Md	3	0	1	1	17	12	18	0	56	0	0	73
Billings, Mont	0	0	----	0	0	0	0	0	1	0	0	3
Birmingham, Ala	0	0	12	0	1	0	3	0	2	0	0	4
Boise, Idaho	0	0	----	0	1	0	0	0	2	0	0	0
Boston, Mass	0	0	----	0	152	5	22	0	145	0	0	22
Bridgeport, Conn	0	0	2	0	6	0	6	0	7	0	0	1
Brunswick, Ga	0	0	--	0	1	0	4	0	0	0	0	0
Buffalo, N Y	0	0	----	2	143	1	8	0	6	0	0	17
Camden, N J	0	0	-	0	29	0	0	0	1	0	0	14
Charleston, S C	1	0	92	0	0	0	5	0	0	0	0	0
Charleston, W. Va	0	0		0	0	0	0	0	0	0	0	0
Chicago, Ill	11	0	4	3	323	4	36	0	62	0	1	47
Cincinnati, Ohio	0	0	4	0	45	0	6	0	33	0	0	0
Cleveland, Ohio	0	0	2	1	7	0	16	0	52	0	0	49
Columbus, Ohio	1	0	----	0	6	0	12	0	8	0	0	0
Concord, N H	0	0	----	2	0	0	0	0	2	0	0	0
Cumberland, Md	0	0	--	0	0	0	0	0	0	0	0	2
Dallas, Tex	2	0	---	0	1	0	2	0	3	0	0	13
Denver, Colo	3	0	31	0	248	0	9	0	12	0	0	3
Detroit, Mich	0	0	----	5	140	2	16	0	31	0	0	68
Duluth, Minn	1	0	----	0	1	0	0	0	5	0	0	3
Fall River, Mass	0	0	--	0	3	0	1	0	3	0	0	14
Fargo, N Dak	0	0	----	0	0	0	0	0	1	0	0	0
Flint, Mich	1	0	---	0	3	1	0	0	2	0	0	4
Fort Wayne, Ind	0	0	---	0	1	0	3	0	12	0	0	0
Frederick, Md	1	0	----	0	0	0	0	0	0	0	0	0
Galveston, Tex	1	0	-	0	0	0	2	0	1	0	0	0
Grand Rapids, Mich	0	0	1	0	8	0	1	0	2	0	0	11
Great Falls, Mont	0	0	----	0	14	1	1	0	3	0	0	4
Hartford, Conn	0	0	1	0	11	0	0	0	2	0	0	1
Helena, Mont	0	0	----	0	10	0	0	0	1	0	0	0
Houston, Tex	3	0	----	1	2	0	15	0	7	0	0	5
Indianapolis, Ind	0	0	----	0	110	0	13	0	15	0	0	16
Kansas City, Mo	0	0	----	2	93	2	10	0	50	0	0	7
Kenosha, Wis	0	0	----	0	1	0	0	0	4	0	0	0
Little Rock, Ark	0	0	3	0	0	0	2	0	1	0	0	0
Los Angeles, Calif	3	0	21	2	61	2	5	1	25	0	1	21
Lynchburg, Va	0	0	----	0	1	0	0	0	1	0	0	1
Memphis, Tenn	0	0	----	2	9	1	4	0	6	0	0	18
Milwaukee, Wis	0	0	----	0	235	2	0	0	110	0	0	14
Minneapolis, Minn	0	0	----	0	5	0	7	1	15	0	0	9
Missoula, Mont	1	0	----	0	2	0	0	0	0	0	0	2
Mobile, Ala	0	0	5	2	0	1	3	0	1	0	0	0
Nashville, Tenn	0	0	----	0	87	0	7	0	2	0	0	8
Newark, N J	0	0	1	0	14	2	10	0	16	0	0	16
New Haven, Conn	0	0	---	0	4	2	1	0	7	0	0	1
New Orleans, La	1	1	5	1	59	3	17	0	8	0	3	2
New York, N. Y	21	1	10	3	320	29	96	0	468	0	4	57
Omaha, Nebr	1	0	-	0	4	0	9	0	0	4	0	2
Philadelphia, Pa	1	0	2	3	1,014	10	37	0	119	0	0	69
Pittsburgh, Pa	1	0	1	1	3	6	23	0	13	0	0	21
Portland, Maine	0	0	----	0	0	3	3	0	1	0	0	17
Providence, R. I	0	0	1	0	11	4	8	0	5	0	0	24

City reports for week ended February 27, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Pueblo, Colo	0	0	------	0	2	1	3	0	0	0	0	1
Racine, Wis	0	0	------	0	7	0	0	0	68	0	0	0
Reading, Pa	0	0	------	0	114	0	2	0	2	0	0	9
Richmond, Va	0	0	7	1	8	5	3	0	3	0	0	1
Roanoke, Va	1	0	------	1	2	0	3	0	1	0	0	0
Rochester, N. Y	0	0	------	0	15	0	6	0	8	0	0	21
Sacramento, Calif	4	0	------	0	12	3	0	4	4	0	0	0
St Joseph, Mo	0	0	------	0	2	1	7	0	1	0	0	0
St. Louis, Mo	0	0	3	2	26	10	22	0	17	0	0	2
St. Paul, Minn	0	0	------	0	7	0	3	0	8	0	0	45
Salt Lake City, Utah	0	0	------	0	116	0	5	1	19	0	0	11
San Antonio, Tex	1	0	1	1	4	0	11	0	0	0	0	2
San Francisco, Calif	1	0	3	3	51	8	18	0	18	0	0	19
Savannah, Ga	0	0	19	5	0	0	4	0	1	0	0	0
Seattle, Wash	0	0	------	0	64	0	5	0	6	0	0	9
Shreveport, La	0	0	------	1	0	0	9	0	0	0	0	0
South Bend, Ind	0	0	------	0	2	0	0	0	0	0	0	3
Spokane, Wash	0	0	------	0	175	0	2	0	2	0	0	0
Springfield, Ill	0	0	------	0	2	0	3	0	2	0	0	21
Springfield, Mass	0	0	------	0	2	0	0	0	100	0	0	0
Superior, Wis	0	0	------	0	1	0	0	0	0	0	0	4
Syracuse, N. Y	0	0	------	1	11	3	4	0	7	0	0	18
Tampa, Fla	0	0	------	0	1	1	7	1	1	0	0	0
Terre Haute, Ind	0	0	------	0	2	0	3	0	0	0	0	0
Topeka, Kans	0	0	------	0	73	0	3	0	3	0	0	4
Trenton, N. J	0	0	------	0	28	0	3	0	6	0	0	0
Washington, D. C	0	0	------	2	94	2	14	0	35	0	0	26
Wheeling, W. Va	0	0	------	0	1	1	1	0	3	0	1	4
Wichita, Kans	0	0	------	0	23	0	4	0	3	0	0	4
Wilmington, Del	0	0	------	0	10	1	5	0	3	0	0	4
Wilmington, N. C	0	0	------	0	4	0	2	0	2	0	0	5
Winston-Salem, N. C	0	0	1	0	1	1	1	0	2	0	0	25
Worcester, Mass	0	0	---	0	175	2	8	0	11	0	0	10
Total	64	2	264	50	4,252	132	600	8	1,675	4	10	914
Corresponding week 1942	70	2	273	40	3,573	43	484	3	1,470	0	12	1,012
Average, 1938-42	105	------	765	[1] 84	[2] 4,249	------	[1] 594	------	1,523	19	19	1,065

Anthrax.—Cases. Camden, 1
Dysentery, amebic.—Cases: New York, 2
Dysentery, bacillary.—Cases. Baltimore, 1; Charleston, S. C., 1; Detroit, 1; Los Angeles, 1; New York, 5.
Dysentery, unspecified.—Cases: San Antonio, 2.
Tularemia.—Cases: New Orleans, 2.
Typhus fever.—Cases: Houston, 1.

[1] 3-year average, 1940-42.
[2] 5-year median.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—During the week ended February 20, 1943, 15 rats proved positive for plague were reported in Hamakua District, Island of Hawaii, T. H., as follows: 1 rat in Honokaa, 3 rats in Kapulena area, and 11 rats in Paauhau area.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 13, 1943.—During the week ended February 13, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		34		142	349	43	45	18	42	673
Diphtheria	3	18	1	22		9		1		54
Dysentery (bacillary)				7						7
German measles				10	16		9		10	45
Influenza		35	9		7	16			31	98
Measles		64	3	95	158	28	151	4	66	569
Meningitis, meningococcus	1	1		1	1	2			1	7
Mumps	6	103	5	37	1,025	173	82	90	156	1,677
Poliomyelitis						1				1
Scarlet fever		15	11	90	98	30	20	66	14	344
Tuberculosis (all forms)	1	8	6	84	44	17		18	15	193
Typhoid and paratyphoid fever				10						10
Whooping cough		3		123	112	41	7	38	10	334

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Cholera

Ceylon.—During the week ended January 30, 1943, 24 cases of cholera with 22 deaths were reported in Ceylon.

Plague

Madagascar.—For the period January 11–21, 1943, 11 cases of plague with 10 deaths were reported in Madagascar.

Smallpox

Algeria.—For the period February 1–10, 1943, 57 cases of smallpox were reported in Algeria, including 5 cases in Algiers, and 4 cases in Oran.

Indochina.—For the period December 21–31, 1942, 72 cases of smallpox were reported in Indochina.

Typhus Fever

Algeria.—For the period February 1–10, 1943, 419 cases of typhus fever were reported in Algeria, including 11 cases in Algiers, 5 cases in Bone, 1 case in Mostaganem, and 33 cases in Oran.

Hungary.—For the 2 weeks ended February 20, 1943, 25 cases of typhus fever were reported in Hungary.

Rumania.—For the period February 16–28, 1943, 633 cases of typhus fever were reported in Rumania, as compared with 349 cases reported for the period February 2–15, 1943.

Slovakia.—For the period January 24 to February 6, 1943, 15 cases of typhus fever were reported in Slovakia.

* * *

DEATHS DURING WEEK ENDED MARCH 6, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Mar. 6, 1943	Corresponding week, 1942
Data from 87 large cities of the United States		
Total deaths	9,567	9,210
Average for 3 prior years	9,171	
Total deaths, first 9 weeks of year	90,310	82,930
Deaths under 1 year of age	698	621
Average for 3 prior years	536	
Deaths under 1 year of age, first 9 weeks of year	6,335	5,024
Data from industrial insurance companies		
Policies in force	65,417,553	64,951,480
Number of death claims	14,235	13,406
Death claims per 1,000 policies in force, annual rate	11.3	10.8
Death claims per 1,000 policies, first 9 weeks of year, annual rate	10.7	10.2

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease, (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 58 MARCH 26, 1943 NUMBER 13

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol. 58* • MARCH 26, 1943 • *No. 13

AQUEOUS-BASE YELLOW FEVER VACCINE [1]

By M. V. HARGETT, *Surgeon*, H. W. BURRUSS, *Associate Technologist*, and ANTHONY DONOVAN. *Passed Assistant Surgeon, United States Public Health Service*

Man develops effective active immunity to yellow fever only as a result of infection with the virus of that disease. Such infection may occur by contraction of the disease or by vaccination with living virus. Although Finlay (*1*) in 1881 and Gorgas and Guiteras (*2*) in 1901 attempted immunization with living yellow fever virus, the first successful vaccine was that developed by Sawyer, Kitchen, and Lloyd (*3*) in 1931. The latter investigators employed Theiler's (*4*) neurotropic modification of the French strain and human immune serum. Numerous modifications of this vaccine were developed, the most extensively employed being the neutrotropic virus without immune serum prepared by Sellards and Laigret (*5, 6*) and Laigret (*7, 8, 9*) and the virus mixed with smallpox vaccine given by dermal scarification by Peltier, Durieux, Jonchere, and Arquie (*10, 11*). The next advance was the substitution of a less virulent virus strain grown in mouse embryo tissue culture by Lloyd, Theiler, and Ricci (*12*). A yet more attenuated virus, known as the 17 D strain, was brought out by Theiler and Smith (*13*) and first employed for human immunization in 1936. Vaccine prepared with the 17 D virus consisted of an extract of infected chick embryos in nonimmune human serum (*14, 15*). It may be designated "17 D serum-base" vaccine. An experience of 6 years with this vaccine, involving more than 2,000,000 vaccinations, has demonstrated the superiority of the 17 D strain for human immunization (*14, 15, 16, 17, 18, 19, 20, 21*).

The elimination of serum from the 17 D serum-base vaccine and utilization of the infected embryo extract alone was advocated by one of us (M. V. H.) early in 1939. Such a vaccine was prepared and used in Brazil in December 1940, as reported by Fox, Manso,

[1] From the Rocky Mountain Laboratory of the Division of Infectious Diseases, National Institute of Health.

Penna, and Madureira Para (*22*). This modified vaccine, without serum, may be designated "17 D aqueous-base" vaccine. The serum-base product continued to be generally employed while studies of the aqueous-base preparation were under way.

The preparation of yellow fever vaccine was initiated by the United States Public Health Service in February 1941, in a unit established at its Rocky Mountain Laboratory. The making of 17 D aqueous-base vaccine was undertaken at that time with seed virus kindly supplied by J. H. Bauer of the Rockefeller Foundation. Studies were pursued to determine the best method of preparing, preserving, and administering this simplified product. Human vaccination was first accomplished in July of the same year. A field study of the comparative behavior of serum-base and aqueous-base 17 D vaccines was then undertaken at Oroya, Peru, under the auspices of the Pan-American Sanitary Bureau. Two hundred and three persons, nonimmune to yellow fever,[2] were vaccinated, 102 with a 17 D serum-base preparation and the remainder with a 17 D aqueous-base vaccine. None developed untoward reactions. Unfortunately, postvaccination serum specimens could be obtained from only 13 of the first group and 9 of the second. These 22 serums were subjected to the virus neutralization test and all showed immune bodies present.

An additional 19 persons, presumably nonimmune, who received the aqueous-base vaccine at various times at Hamilton, Mont., were all subsequently shown to possess neutralizing bodies. Meanwhile, soldiers of the United States Army, in considerable numbers, were found to be developing acute hepatitis following vaccination with certain 17 D serum-base vaccine preparations (*24*). Foregoing further field trials, the production of the aqueous-base vaccine was increased in the first semester of 1942 and released for general use.

PREPARATION AND PRESERVATION

The 17 D aqueous-base vaccine, as prepared by the United States Public Health Service, is a distilled water extract of 10- to 11-day-old infected chick embryos which is preserved by desiccation and storage at subfreezing temperatures. Fresh, fertile eggs are incubated, as for hatching, for 7 days. Those eggs showing viable embryos are then each inoculated with 0.05 ml. of 227th to 230th passage 17 D virus via a small hole drilled through the shell in the center of the larger end. Egg passage rather than tissue culture propagated virus is employed. It is unimportant whether the virus is deposited within or only near the embryo. After sealing the inoculation holes with hot wax, the eggs are returned to incubation as

[2] Blood was drawn just prior to vaccination and later tested by the protection test method of Sawyer and Lloyd (*23*) for the determination of immune bodies.

before for a further 90 to 96 hours. The eggs are then opened, the living embryos freed of attached membranes and deposited in a homogenizer. Dead embryos are discarded. For each three grams of embryo there is added 1.0 ml. of distilled water. This added water serves to reduce the viscosity of the resulting extract and aids in rupture of tissue cells by alteration of the osmotic pressure. The embryo-water mixture is then homogenized for 10 minutes, being kept cool with a pack of dry ice about the container. Next the suspension is centrifuged for 30 minutes at 3,500 r. p. m. and the supernatant drawn off while the sediment is discarded. Specimens are taken for sterility and virus concentration determinations; the remainder of the extract is run into a 1-liter pyrex bottle and frozen into a thin-walled, hollow cylinder by rotating in an alcohol-dry ice bath. The term "shelling" has been applied to this method of freezing. The frozen extract is stored at minus 60° to 78° C. pending distribution into ampoules. Extract showing contamination or a virus concentration of less than 25,000, as determined by the method of Reed and Muench (*25*), is discarded.

One to six bottles of extract (generally 300 to 500 ml. per bottle), free of contamination and of adequate titer, are then melted in water at 37° C., pooled, and distributed in quantities of 1.0 and 5.0 ml. into specially designed pyrex glass ampoules of 6.5 ml. and 28.0 ml. capacity, respectively. With extract of a titer of 200,000 or more, only half quantities may be distributed. The vaccine is next shelled in a cold alcohol bath at a temperature of minus 60° to 70° C., utilizing a special machine designed for the purpose. It is then temporarily stored at minus 22° C. pending initiation of desiccation one-half to two hours later.

The vaccine is dried under high vacuum from the frozen state, employing a "lyophile" type desiccator patterned after the apparatus described by Bauer and Pickels (*26*). Desiccation lasts 21 hours with the vaccine held at minus 22° C. for approximately the first 10 hours. The temperature is then slowly elevated to 24° C. at which level it is maintained during the terminal 1 to 2 hours. The vacuum is 1 to 2 microns at completion of drying. The desiccation system is then filled with dry (oil pumped) nitrogen to atmospheric pressure and the ampoules promptly sealed.

A rigid aseptic technique is depended on to insure freedom from contaminants. Approximately 10 percent of embryo extract lots are discarded due to actual or suspected contamination. Extraneous organisms have been encountered in less than 2 percent of desiccated lots.

Following desiccation the ampoules are inspected as to content and container defects, labeled, inspected again, packed in boxes, and stored at a temperature of minus 16° to minus 30° C.

Each lot of vaccine is subjected to the following series of rigid control tests before being considered for human use:

1. Cultures are made using dextrose broth, both aerobic and anaerobic tubes, Brewer's or Linden's thioglycollate media, and chocolate agar slants to detect contaminants.
2. Three guinea pigs [3] are each injected intraperitoneally with 3.0 ml. of vaccine to detect organisms which might fail to develop in the media. In case one or more of the guinea pigs become ill from nonrelated intercurrent disease, a substitute series is inoculated.
3. Virus content is determined by inoculation of decimal dilutions into white Swiss mice and calculated by the 50 percent end-point method of Reed and Muench (*25*).
4. A healthy rhesus monkey, previously shown by protection test not to harbor yellow fever antibodies, is bled and immediately thereafter inoculated intracerebrally with vaccine from a single lot. One-quarter milliliter of a 1:5 dilution is injected into the right frontal lobe. The animal is bled on the second, third, and fourth days following inoculation to determine the presence of circulating virus as described by Theiler and Smith (*13*). Fourteen days following injection of vaccine the monkey is bled again and serum from both pre- and 14-day post-inoculation bleedings placed in the same virus neutralization test "run" for determination of virus neutralizing bodies. Each test monkey is observed for approximately 1 month.

To be accepted for human use a lot of vaccine must conform to the following requirements:

1. Sterility cultures must show no growth.
2. None of a series of three guinea pigs inoculated intraperitoneally may show illness or a temperature of more than 39.7° C. during the 2 weeks immediately following injection.
3. A minimum of 66,000 minimum lethal mouse doses of virus per milliliter must be present.
4. The test monkey must show circulating virus and a reversal of protection test; i. e., the preinoculation serum specimen must show virus neutralizing bodies absent, and the postvaccination specimen show them present. The animal must recover from any illness incurred, without signs of paralysis having developed at any time. The vaccine is discarded if the test monkey develops paralysis or dies, regardless of apparent cause.

In a consecutive series of 60 monkeys inoculated as described, 50 developed fever (40° C. and more) and 10 did not. Of those which

[3] Guinea pigs do not develop fever or become ill as a result of intraperitoneal inoculation of 17 D strain yellow fever virus.

showed fever the average onset was 9 days following injection and the duration 2 days. An occasional monkey, apparently hypersusceptible to 17 D virus, will develop severe encephalitis, frequently with paralysis. Sometimes the encephalitis causes death.

Rate of virus loss varies greatly with different lots of similarly prepared and stored vaccine. Kept at minus 16° to 30° C., an occasional preparation will lose 75 percent or more virus within 3 months, while another will show no loss after 10 months. Suspended in 10 parts of physiological saline at 37° C. for 1 hour, 7 aqueous-base lots showed an average loss of 25.7 percent of virus. A serum-base (36 percent embryo in human serum) preparation exposed 2 hours under like conditions showed a 24.3 percent average loss. Of 20 consecutive vaccine lots prepared in this laboratory and found suitable for human use, one-half of which were prepared by the serum-base method and the remainder by the aqueous-base technique, the average virus content at termination of desiccation for the serum product (average embryo content 29.8 percent) was 994,433 minimum lethal mouse doses per milliliter, and for the aqueous preparation, 4,397,667 doses.

Refrigeration during transit is obtained by packing in carbon dioxide ice within a glass vacuum flask, such as is commercially available. Utilizing a 12-quart flask, refrigeration can be maintained for a week with the container exposed to a temperature of 100° F.

IMMUNIZATION

Instructions accompanying each release of vaccine direct that it be kept at a below-freezing temperature until actual time of use. Following removal from refrigeration, it is rehydrated to original volume with physiological salt solution and then diluted 1:10 with additional saline. It must be well agitated in order to secure a complete and uniform suspension. Each recipient is given 0.5 ml. subcutaneously. The vaccine must be used within 1 hour following rehydration to avoid possibility of inoculating subpotent material. There are no contraindications to vaccination of persons subject to exposure, regardless of age,[4] provided the subject is in a generally fair state of health. Children receive the same dose as adults.

Reactions at site of inoculation have not been observed. An expected mild type of discomfort, characterized by headache, fever, backache, and malaise similar to that described by Soper and Smith (*16*), occasionally develops. The occurrence of postvaccinal jaundice, such as encountered in 1942 among United States Army troops (*24*) who received 17 D serum-base vaccine, has to date not been reported. No reactions of an anaphylactic type have been noted. Studies by Berge and Hargett (*27*) have shown that sensitization

[4] The Yellow Fever Vaccination Service, as carried out in Brazil, recommends mass vaccination of all individuals over 1 year of age (Personal communication from Dr W A Sawyer.)

with this preparation is unlikely as long as 11-day-old or younger embryos are employed in preparing the vaccine. Fox, Lennette, Manso, and Souza Aguiar (*28*) have reported cases of encephalitis (under 1 percent) among more than 100,000 persons inoculated with 17 D aqueous-base vaccine in South America. They believed this to be the result of utilizing a 17 D substrain which had assumed increased neurotropic characteristics. They further reported that encephalitis was not observed with the same vaccine employed in a far distant territory. No unfavorable reactions have been encountered among persons vaccinated with the more than 600,000 doses of aqueous-base vaccine released to date by the United States Public Health Service.

The limited studies made in Peru and at Hamilton, Mont., indicate that the aqueous-base vaccine compares well with the serum-containing product in promoting the formation of immune bodies. Smith, Penna, and Paoliello (*15*), Fox and Cabral (*20*), and Smith, Roca García, Gast Galvis, and Calderon Cuervo (*21*) have reported that approximately 95 percent of persons inoculated with the serum-base preparation developed demonstrable virus neutralizing bodies. This result should be equalled and possibly exceeded with the water-base vaccine, since the same virus strain is employed with the quantity of virus inoculated per recipient generally considerably greater with the aqueous-base product.

The question of when to revaccinate remains to be determined. The studies of Fox and Cabral (*20*), relating to the serum-base vaccine, indicate that immunity from the group standpoint is maintained for at least 4 years. This period will likely be extended as opportunity for more prolonged observation is afforded.

COMMENT

Studies of a more comprehensive nature must be carried out before a full comparison may be made relative to the merits of the aqueous-base vaccine as contrasted with the serum-base product. It would seem, however, that adequate experience has been provided to permit the formulation of preliminary conclusions.

Preparation of the modified vaccine is simplified by elimination of the serum. The possibility of picking up a pathogenic contaminant from the serum diluent is absent. Although virus inactivation is more rapid with the aqueous-base preparation diluted for administration, this is more than compensated by the higher concentration of virus. The serum product contained only 10 to 40 percent virus infected chick extract compared with 75 percent for the aqueous preparation. Although the water-base product contains an increased quantity of chick embryo protein, anaphylactic reactions have not

been observed. The only untoward reactions reported among the considerable number inoculated with the water-base vaccine have been those cases of encephalitis, already referred to (*28*), in the state of Minas Gerais, Brazil. It does not appear likely that these were the result of method of preparation. While determinations relative to immunity established are few,[5] they compare favorably with the more extensive studies (*15*, *20*, *21*) that have been made following vaccination with the 17 D serum-base preparation.

SUMMARY

The preparation of *aqueous-base* living yellow fever vaccine was undertaken by the United States Public Health Service in 1941. This vaccine is an aqueous extract of 10- to 11-day-old chick embryos infected with the attenuated 17 D strain of yellow fever virus. It differs from the 17 D *serum-base* vaccine extensively used in recent years in that it contains 75 percent, rather than 10 to 40 percent, embryo extract and no serum diluent. The extract is preserved by desiccation under high vacuum from the frozen state, with storage at subfreezing temperatures in an atmosphere of dry nitrogen. For administration the dried preparation is rehydrated and diluted 1:10 with physiological saline, with each recipient receiving 0.5 ml. subcutaneously.

The increased virus content of the aqueous product as contrasted with the serum-containing preparation insures that a greater quantity of virus is inoculated per individual vaccinated. This favors host immunization.

In excess of 600,000 doses of the aqueous type vaccine have been released to date for general use without encountering unfavorable reactions. Of 28 individuals studied, all possessed specific virus neutralizing bodies several weeks following vaccination.

Danger of vaccine contamination by serum containing pathogenic agents is eliminated.

REFERENCES

(*1*) Finlay, Carlos E.: Carlos Finlay and yellow fever. Oxford Univ. Press, New York, 1940. Pp. 76–93.

(*2*) Gorgas, W. C.: Sanitation in Panama. Appleton, New York, 1915. Pp. 40–49.

(*3*) Sawyer, W. A., Kitchen, S. F., and Lloyd, W.: Vaccination against yellow fever with immune serum and virus fixed for mice. J. Exp Med., **55**: 945–969 (1932).

(*4*) Theiler, Max: Studies on the action of yellow fever virus in mice. Ann. Trop. Med. and Parasit., **24**: 249–272 (1930).

(*5*) Sellards, A. W., and Laigret, J.: Vaccination de l'homme contre la fièvre jaune. Compt. rend. Acad. d. sc., **194**: 1609–1611 (1932).

[5] In June 1942, at about the time the employment of aqueous-base vaccine was generally initiated in the United States, official regulations were issued directing that only persons leaving for yellow fever areas be vaccinated

(6) Sellards, A. W., and Laigret, J.: Immunisation de l'homme contre la fièvre jaune par l'inoculation du virus de souris. Arch. Inst. Pasteur de Tunis, **21**: 229–238 (1932).
(7) Laigret, J.: Recherches expérimentales sur la fièvre jaune. Arch. Inst. Pasteur de Tunis, **21**: 412–430 (1933).
(8) Laigret, J.: Recherches expérimentales sur la fièvre jaune; technique pour la préparation des vaccins amarils, vaccins glycérinés et vaccins secs. Arch. Inst. Pasteur de Tunis, **22**: 198–204 (1933).
(9) Laigret, J.: Sur la vaccination contre la fièvre jaune par le virus de Max Theiler. Bull. Office internat. d'hyg. pub., **26**: 1078–1082 (1934).
(10) Peltier, M., Durieux, C., Jonchere, H., and Arquie, E.: Pénétration du virus amaril neurotrope par voie cutanée. Vaccination mixte contre la fièvre jaune et la variole. (Note préliminaire.) Bull. Acad. de méd., Paris, **121**: 657–660 (1939).
(11) Peltier, M., Durieux, C., Jonchere, H., and Arquie, E.: Vaccination mixte contre la fièvre jaune et la variole sur des populations indigènes du Sénégal. Bull. Acad. de méd., Paris, **123**: 137–147 (1940).
(12) Lloyd, W., Theiler, Max, and Ricci, N. I.: Modification of virulence of yellow fever virus by cultivation in tissues in vitro. Tr. Roy. Soc. Trop. Med. and Hyg., **29**: 481–529 (1936).
(13) Theiler, Max, and Smith, H. H.: The effect of prolonged cultivation in vitro upon pathogenicity of yellow fever virus. J. Exp. Med., **65**: 767–786 (1937).
(14) Theiler, Max, and Smith, H. H.: The use of yellow fever virus modified by in vitro cultivation for human immunization. J. Exp. Med., **65**: 787–800 (1937).
(15) Smith, H. H., Penna, H. A., and Paoliello, A.: Yellow fever vaccination with cultured virus (17 D) without immune serum. Am. J. Trop. Med., **18**: 437–468 (1938).
(16) Soper, F. L., and Smith, H. H.: Vaccination with virus (17 D) in control of jungle yellow fever in Brazil. Acta Convent. tertii de trop. atque malar. morbis, **1**: 295–313 (1938).
(17) Whitman, Loring: Failure of *Aedes aegypti* to transmit yellow fever cultured virus (17 D). Am. J. Trop. Med., **19**: 19–26 (1939).
(18) Smith, H. H., Calderon Cuervo, H., and Leyva, J. P.: A comparison of high and low subcultures of yellow fever vaccine (17 D) in human groups. Am. J. Trop. Med., **21**: 579–587 (1941).
(19) Soper, F. L.: Febre amarela Panamericana, 1938 a 1942. Boletín de la Oficina Sanitaria Panamericana, **21**: 1207–1222 (1942).
(20) Fox, John P., and Cabral, A. S.: The duration of immunity following vaccination with the 17 D strain of yellow fever virus. Am. J. Hyg., **37**: 93–120 (1943).
(21) Smith, H. H., Roca Garcia, M., Gast Galvis, A., and Calderon Cuervo, H.: Vacunación contra la fiebre amarilla en Columbia. Rev. Fac. de med., Bogotá, **9**: 1–22 (1940).
(22) Fox, John P., Manso, C., Penna, H. A., and Madureira Para, M.: Observations on occurrence of icterus in Brazil following vaccination against yellow fever. Am. J. Hyg., **36**: 68–116 (1942).
(23) Sawyer, W. H., and Lloyd, W.: The use of mice in tests of immunity against yellow fever. J. Exp. Med., **54**: 533–555 (1931).
(24) The outbreak of jaundice in the Army. (War Department, Surgeon General's Office, Circular Letter No. 95.) J. Am. Med. Assoc., **120**: 51–53 (1942).
(25) Reed, L. J., and Muench, H.: A simple method of estimating fifty percent endpoints. Am. J. Hyg., **27**: 493–497 (1938).
(26) Bauer, J. H., and Pickels, E. G.: Apparatus for freezing and drying virus in large quantities under uniform conditions. J. Exp. Med., **71**: 83–88 (1940).
(27) Berge, T. O., and Hargett, M. V.: Anaphylaxis in guinea pigs following sensitization with chick-embryo yellow fever vaccine and normal chick embryos. Pub. Health Rep., **57**: 652–667 (1942).
(28) Fox, John P., Lennette, E. H., Manso, C., and Souza Aguiar, J. R.: Encephalitis in man following vaccination with 17 D yellow fever virus. Am. J. Hyg., **36**: 117–142 (1942).

EXPERIMENTAL CHEMOTHERAPY OF BURNS AND SHOCK

III. EFFECTS OF SYSTEMIC THERAPY ON EARLY MORTALITY[1,2]

By SANFORD M. ROSENTHAL, *Principal Pharmacologist, United States Public Health Service*

In a previous communication (*1*) a method was described for the production of standardized burns in mice, and the effects of local therapy on the mortality during the first 72 hours were reported. The present paper deals with the results obtained from some of the agents commonly employed in the systemic treatment of shock.

METHODS

The technique for the production of burns has been previously outlined (*1*). Shaved, etherized female mice[3] are immersed in a water bath at 70° C. for a measured period of seconds. The foregoing work dealt chiefly with procedures that increased the mortality rate, and a control group in which mortality was 40 to 60 percent within 3 days was employed in order to bring out these increases. In the present studies, where substantial reductions in mortality as a result of therapy were obtained, it was advantageous to secure a control mortality of 80 to 100 percent. This was brought about by lengthening the time of immersion from 4 to 4½ or 5 seconds, and by employing smaller mice (15 to 20 grams). Under these conditions nearly all of the early deaths occurred within the first 24 hours, the majority occurring within the first 12 hours. After the first day the surviving mice had largely recovered from the prostration, dyspnoea, and other visible signs of shock; deaths occurred among these survivors from the third day onward, with histological evidence of toxemia and secondary infection. The present study is concerned only with early mortality, and therapy has been limited to the first 7 hours following the burn. The majority of animals that survived the early period as a result of therapy died in from 3 days to 3 weeks; attempts to influence the mortality during this delayed phase will be the subject of later study.

In this paper, for purposes of brevity, the mortality curves will be shown only for the first 2 days subsequent to the burns. Unless otherwise specified each curve represents 15 mice. Therapy was administered within an hour following the burn, and in some cases repeated at the third and seventh hours. Where comparison was made of hypertonic solutions by mouth, drinking water was withheld from all mice for 7 hours.

[1] From the Division of Chemotherapy, National Institute of Health.

[2] The first paper in this series is: Experimental chemotherapy of burns and shock. I. Methods. II. Effect of local therapy. Pub. Health Rep., 57: 1923 35 (1942).

[3] The diet of these mice consisted of pellets, the composition of which has been previously stated (Pub Health Rep. 56: 1880 (1941)).

EPINEPHRINE AND POSTERIOR PITUITARY EXTRACT

Epinephrine.—Subcutaneous administration of epinephrine in peanut oil was used in order to obtain a prolonged effect. The maximum tolerated dose for normal mice was found to be approximately 0.05 mg. per 20 gm. mouse (L. $D_{.50}$=3.25 mg. per kg. of body weight). The 0.2 percent suspension of epinephrine in oil was diluted in peanut oil so that the volume injected was 0.02 to 0.04 cc. Control animals received similar quantities of oil alone.

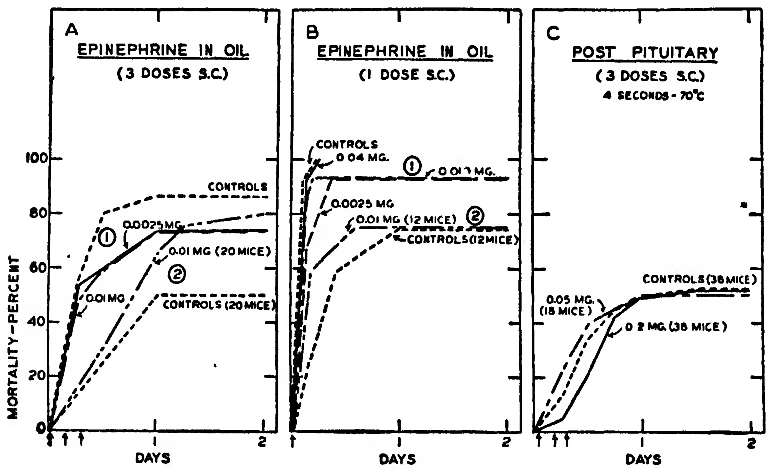


FIGURE 1. Absence of effect of epinephrine and posterior pituitary extract on the acute mortality of burned mice (A) In experiment A 1, mice immersed in water at 70° C. for 4½ seconds, in A 2, for 4 seconds Three doses S C at 1, 4, and 7 hours, with amounts at each injection shown on chart (B) In B 1, mice immersed for 4½ seconds, in B 2, 30 gm. mice immersed for 4 seconds One dose of epinephrine shortly after burn. (C) Composite of two experiments with posterior pituitary. Mice immersed for 4 seconds. All subsequent curves represent 15 mice of 15 to 20 grams unless otherwise specified

Four experiments, under conditions of high or low mortality among the control mice, and with single or multiple doses of epinephrine, revealed no effect from this treatment (fig. 1 A and B).

The use of epinephrine in shock is a controversial subject although the majority of investigators believe it to be of no benefit (*2*). Kabat and Freedman (*3*) have recently reported prolongation of life from its use in experimental traumatic shock in cats.

Posterior pituitary.—Solutions were made from the United States Pharmacopoea standard powder. Subcutaneously the toxicity to mice was low, 2 mg. per mouse (0.1 gm. per kg.) causing only transitory dyspnea. The volume of solution injected following burns was 0.02 cc., and like amounts of saline were given the controls. Three doses of 0.05 to 0.2 mg. per mouse had no effect on the mortality rate. Two experiments gave similar results and are combined in figure 1 C.

The absence of effects from epinephrine and posterior pituitary extract when administered systemically suggests that the beneficial

action obtained from local application in saline solutions (*1*) was due to local vasoconstriction which could either inhibit the degree of exudation or retard the absorption of toxic substances from the burned area.

ADRENAL CORTICAL HORMONES

Studies were carried out with subcutaneous administration of desoxycorticosterone acetate in sesame oil and with an aqueous extract ("Eschatin") containing 25 dog units per cc. Control animals were given similar amounts of either sesame oil or saline. Injections were given within 1 hour and at 3 and 7 hours after the burn. It was found that the saline brought about a significant reduction in mortality so that an additional control group without saline was required.

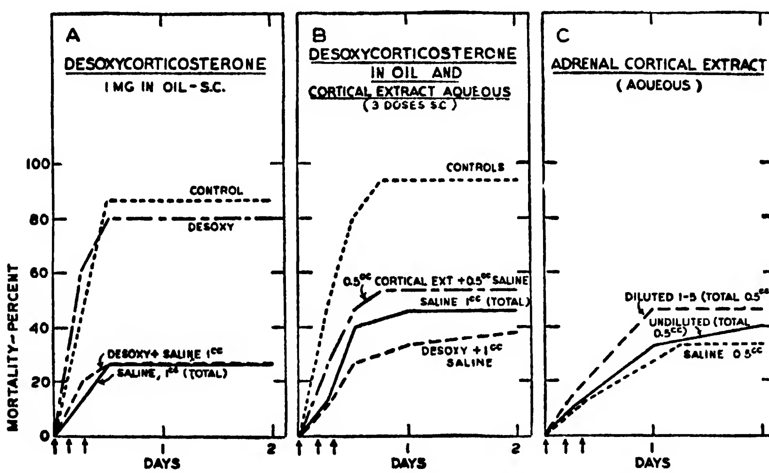


FIGURE 2.—Lack of effect of adrenal cortical hormones, alone or with saline, given S. C. within 1 hour after burns and repeated in 4 and 7 hours. In A and B, immersion for 4½ seconds, in C, for 4 seconds. No controls without saline used in C.

It is seen from figure 2 that no effect on the mortality curves was obtained from these hormones. The aqueous extract (containing 0.8 percent saline) gave values similar to saline alone, while the corticosterone in oil, alone or with saline, resulted in mortality rates similar to those with control oil or with saline alone. Total amounts of 0.1 to 0.5 cc. of the aqueous extract and of 1 mg. of the corticosterone divided into 3 doses were used.

Cortical hormones in the hands of previous investigators have afforded protection in experimental shock of various types (*4*, *5*, *6*, *7*). Such results have been obtained largely from prophylactic doses administered some hours before the trauma, although Perla and associates (*8*) report some therapeutic effect from an aqueous extract in

histamine shock in mice and rats. Further studies are required to determine whether a prophylactic effect can be obtained under the conditions of our experiments, or whether the intravenous administration of the aqueous extract will possess some action.[4]

SODIUM CHLORIDE

The ability of NaCl to reduce the early mortality from burns has been subjected to detailed study. It was found that oral or intraperitoneal administration is more effective than intravenous. Among 45 mice in each group the mortality following 1 cc. by mouth was 46.6 percent in 1 day and 48.8 percent in 2 days as compared with

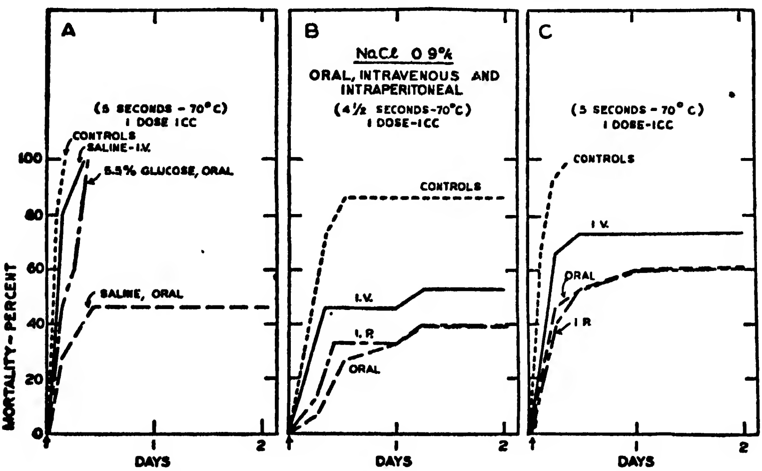


FIGURE 3.—Comparison of action of 0.9 percent NaCl administered orally, intravenously, and subcutaneously. One cc. given within an hour after the burn.

73.3 and 75.5 percent respectively, with intravenous injections (Difference=26.7 percent. P. E. Diff.=± 6.6) and 95.5 percent among the controls (fig. 3). Two oral doses of 1 cc. of 0.9 percent NaCl given by mouth within 1 hour and at 4 hours after the burn to 45 mice gave a mortality of 13.3 percent in 1 day and 17.7 percent in 2 days, as compared with 93.3 percent among 45 controls (fig. 4 A, B, and C). One oral dose of 1 cc. given within an hour after the burn to 150 mice gave a mortality of 34.3 percent in 1 day and 36 percent in 2 days as compared to 92 percent in 1 and 2 days for 150 controls. In two experiments not shown in the charts a total of 3.5 cc. of 0.9 percent NaCl intraperitoneally in 3 doses at 1, 4, and 7 hours after the burn gave, in 30 mice, no mortality in 1 day and 3.3 percent in 2 days, as compared to 80 percent the first day and 83.3 percent the second day among 30 controls.

[4] Later studies revealed no effects from "Eschatin" and from cortical extract (Wilson) given in 0.25 cc. prophylactic doses at 18 hours and at 1 hour preceding the burn.

For a period of hours after the burn the treated animals exhibited a degree of prostration and dyspnea hardly distinguishable from the controls. Recovery occurred from a state presenting all of the symptomatic manifestations of shock.

It was also found that with oral administration isotonic solutions were superior to hypertonic. The same amount of NaCl per mouse (9 mg.) was more effective when given in 1 cc. of water than when given in 0.1, 0.2, or 0.4 cc. Furthermore, 1 cc. of 0.9 percent NaCl was superior to 1 cc. of 4.5 percent (fig. 4 A, B, and C). These results were to be expected since hypertonic solutions by mouth may cause an initial increase in hemoconcentration.

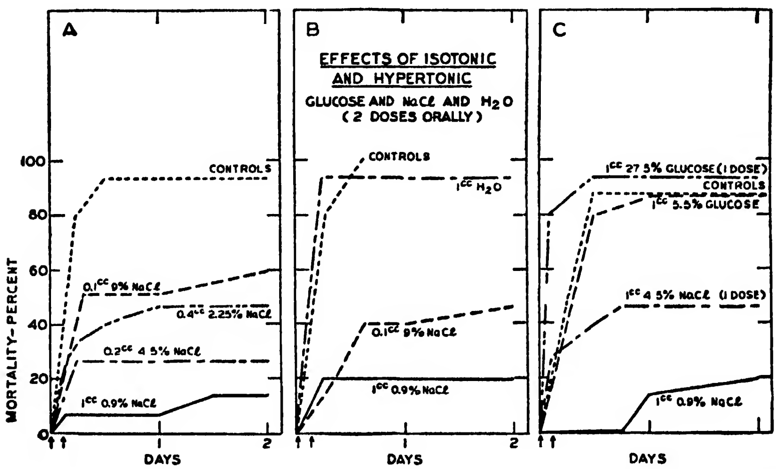


Figure 4.—The superiority of isotonic to hypertonic NaCl orally Lack of benefit from water and glucose orally. Immersion for 4½ seconds in all cases.

WATER, GLUCOSE, KCl, AND CALCIUM

Water.—Two doses of 1 cc. of water orally were without benefit, if not actually deleterious. The average survival time of the 14 out of 15 mice that succumbed was 4.6 hours (S. D.$=\pm$ 1.095) as compared to 7.2 hours (S. D.$=\pm$ 3.53. P. E. Diff.$=\pm$ 0.645) for the controls (fig. 4 B). The possible harm from large amounts of water orally in shock following burns has been suggested (*9*) but not hitherto demonstrated.

Glucose.—Isotonic solutions of glucose (5.5 percent) had only slightly favorable effects on the acute mortality (figs. 3 A and 4 C), while five times this strength (27.5 percent) caused the animals to die faster than the controls. This is in contrast to the results produced by comparable solutions of NaCl (fig. 4 C).

KCl.—The behavior of glucose suggested that other factors besides restoration of fluid balance are important in the prevention of early

death following burns. This was further borne out by the behavior of KCl, which could, to a certain extent, replace NaCl as an electrolyte.

It was necessary to take into account the toxicity of KCl and allow a sufficient margin between the doses employed in burned animals and the maximum dose tolerated by normal mice. The $L.D._{50}$ by mouth for normal mice was approximately 1.5 gm. per kg. The addition of sodium is known to decrease the intravenous toxicity of KCl (*10*), and by mouth the following results have been obtained:

	Number of mice treated	*Number died*
5 percent KCl:		
KCl 0.5 gm. per kg	5	0
KCl 1.0 gm. per kg	10	0
KCl 1.5 gm. per kg	10	6
KCl 2.0 gm. per kg	10	10
5 percent KCl + 4.5 percent NaCl:		
KCl 1.0 gm. per kg	5	0
KCl 1.25 gm. per kg	5	0
KCl 1.5 gm. per kg	5	0
KCl 2.0 gm. per kg	10	1
KCl 2.5 gm. per kg	10	4
KCl 3.0 gm. per kg	5	5

Administered orally to burned mice 1 percent KCl alone or equal parts of 1 percent KCl + 0.9 percent NaCl resulted in mortality curves higher than the controls. In the latter experiments the dose of KCl employed was one-ninth to one-eighteenth of the maximum dose tolerated by normal mice. The administration of one part of KCl to three parts of NaCl brought about a partial antagonism of the effects of NaCl (fig. 5 A, B, and C).

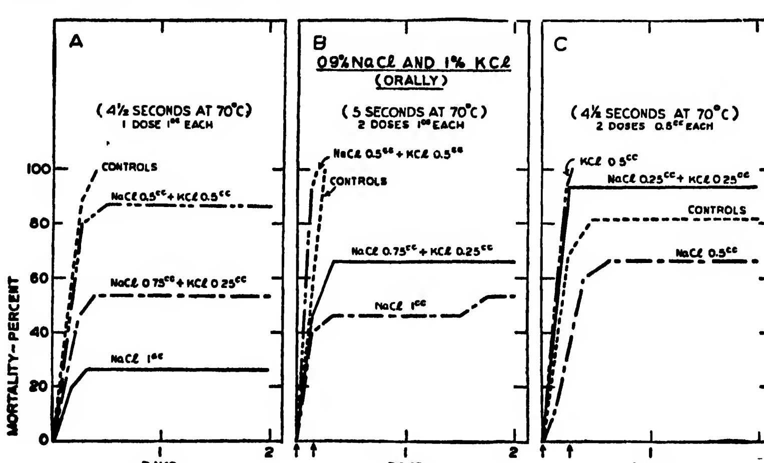


FIGURE 5.—KCl hastens death of burned mice, and antagonizes the action of NaCl. One percent KCl and 0.9 percent NaCl orally. 0.5 cc. doses in C.

Whether the degree of antagonism of Na:K as shown in normal mice is of sufficient magnitude to account for the effects in burned animals

cannot be decided without studies of the concentrations of these elements in the blood and tissues of burned animals.

Calcium.—Only tentative conclusions can be drawn concerning calcium since only two experiments were performed, and since the rate of absorption of calcium gluconate from the alimentary tract of the mouse is not known. A 7 percent solution of the gluconate was used, as this is equimolar to 0.9 percent NaCl. One cc. of this solution orally to normal mice caused no symptoms other than slight dyspnea. Administered to burned mice 0.5 cc. orally did not affect the mortality rate, while 0.25 cc. did not antagonize the action of 1 cc. of saline (fig. 6 B). These results indicate that calcium is without effect.

COMPARISON OF SODIUM SALTS

The effectiveness of sodium acetate, succinate, bicarbonate, and lactate was compared with the effectiveness of NaCl. The strengths of the solutions were such that each contained the same amount of sodium as 0.9 percent NaCl. Two experiments of 15 mice each were

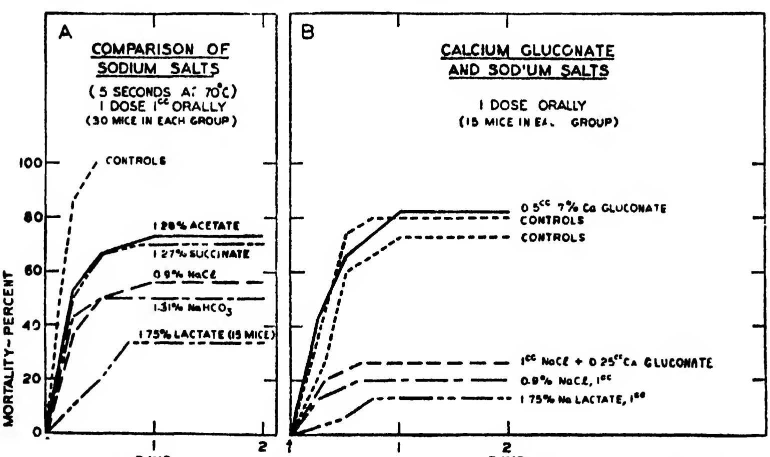


FIGURE 6.—Comparison of oral administration of sodium chloride, acetate, succinate, bicarbonate, lactate; 1 cc. of each solution contains 3.6 mg. of sodium. Calcium gluconate is without effect. Two experiments combined in A (30 mice in each group).

used for each salt, employing 1 cc. orally within an hour after the burn. Slight differences upon the mortality rate were noted. The lactate gave the lowest mortality curves, but the difference (15.3 percent. P. E. Diff. $= \pm 7.9$) is not significant statistically and would require a larger series of animals to establish its validity (fig. 6 A and B).[5]

Apart from the fact that these other salts of sodium serve as a source of alkali in the body, a possible advantage because of the acidosis in shock, it was considered desirable to evaluate the activity of salts that

[5] Further studies revealed that the difference was not significant.

are less disagreeable to taste and less likely to cause vomiting than NaCl.

COMPARISON OF SERUM INTRAVENOUSLY WITH NaCl ORALLY

Two experiments were carried out upon mouse serum. The blood for each test was obtained by decapitation of 100 large mice. After standing overnight at 6° C., the serum was collected by centrifugation, and sterilized by passage through a Seitz filter. The first batch (fig. 7 A) caused marked transitory dyspnea in normal mice, but the second batch (fig. 7 B) was processed after the method of Goodner (*11*), and 1 cc. was tolerated in normal mice without symptoms.

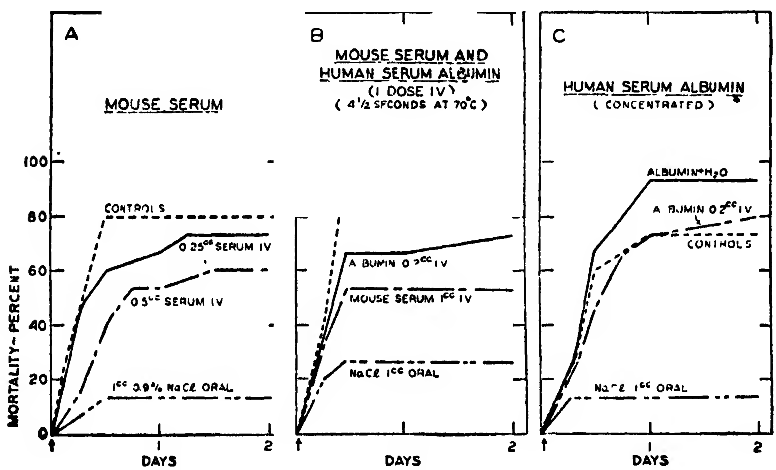


FIGURE 7.—Comparison of mouse serum and of 25 percent human serum albumin intravenously with 0.9 percent NaCl orally. The albumin solution was five times isotonic, and in experiment C one group was given 0.8 cc. of water by mouth following 0.2 cc. of albumin I. V.

The serum was injected intravenously into the lateral tail veins within an hour following the burns. Amounts of 0.25 cc., 0.5 cc., or 1 cc. proved less effective than 1 cc. of saline orally. The validity of the differences between the 1 cc. doses must be established upon a larger series of mice.

A few experiments were made upon two samples of normal human serum albumin, obtained through the courtesy of Commander L. R. Newhouser, Medical Corps, United States Navy. These preparations contained 25 percent serum albumin in buffered solutions containing 0.9 percent NaCl, and were osmotically five times the isotonic strength of human blood plasma. They proved to be of low toxicity to the mouse, 0.5 cc. intravenously being tolerated by normal mice.

In burned mice 0.2 cc., representing 1 cc. of isotonic solution, was injected intravenously. Only slight reduction in mortality was obtained from this treatment. A comparison of two experiments with

a total of 30 mice in each group shows a mortality of 73 percent with serum albumin, 20 percent with saline orally, and 87 percent among the controls. An additional group of 15 mice was given 0.8 cc. of water orally along with the intravenous albumin, in order to compensate for the hypertonicity. No benefit resulted from this procedure (fig. 7 B and C).

The ineffectiveness of human serum albumin must be appraised with consideration of the fact that it represents a protein foreign to the mouse. On the other hand it is possible to correlate the degree of effect of this preparation and of mouse serum with the sodium contained in the doses administered.

DISCUSSION

It would appear from these experiments that the acute mortality following burns in mice is closely related to a disturbance of the sodium: potassium balance in the body as well as the escape of fluids from the circulation. The former factor seems the more important, and indeed may be causally connected with the hemoconcentration and other effects attributed to the loss of fluids in the burned area. This view has been maintained by Scudder (*12*), who has emphasized the role of potassium as a toxic factor in shock although his conclusions have not been generally accepted (*2*, *13*, *14*). Further considerations of the specific roles of the sodium ion, potassium ion, and fluid loss, as well as the underlying mechanisms by which these changes are brought about, must be left for future study and discussion.

In future experiments dealing with the systemic therapy of shock in burns it is believed that NaCl orally should be used as a standard of comparison. A more extensive investigation of the effects of blood and blood substitutes is desirable. Since it is possible to bring about the survival of most of the animals through the stage of shock, and since the majority of these mice die during the subsequent two weeks, attention can be directed to the experimental chemotherapy of these later phases of burns.

SUMMARY

Employing a standardized procedure for the production of burns fatal to mice within 48 hours, the effects of systemic therapy have been studied.

No benefit was observed from epinephrine, posterior pituitary extract, adrenal cortical extract, or desoxycorticosterone acetate injected subcutaneously following the burns.

Sodium chloride by mouth or intraperitoneally caused a significant reduction in the mortality. Intravenous administration was less effective. Isotonic NaCl by mouth was superior to hypertonic solutions.

KCl caused an acceleration in the time of death, and when administered with NaCl it antagonized the effects of the latter. Calcium gluconate orally was without action.

Isotonic glucose solutions orally showed slight therapeutic action. The administration of hypertonic glucose or water by mouth caused the animals to die faster than the controls.

Sodium acetate, succinate, bicarbonate, and lactate were as effective as NaCl.

Mouse serum intravenously was slightly less active than equivalent volumes of 0.9 percent NaCl orally. Little effect was observed from the intravenous administration of a hypertonic solution of human serum albumin.

REFERENCES

(*1*) Rosenthal, S. M.: Experimental chemotherapy of burns and shock. I. Methods. II. Effects of local therapy upon mortality from shock. Pub. Health Rep., **57**: 1923 (December 18, 1942).
(*2*) Harkins, H. N.: The Treatment of Burns. Chas. C. Thomas, Baltimore, 1942.
(*3*) Kabat, H., and Freedman A. M.: Effect of slowly absorbed epinephrine in experimental shock. Proc. Soc. Exp. Biol. and Med., **46**: 385 (1941).
(*4*) Swingle, W. W., Hays, H. W., Remington, J. W., Collings, W D., and Parkins, W. M.: The effect of priming doses of desoxycorticosterone acetate in preventing circulatory failure and shock in the adrenalectomized dog. Am. J. Physiol., **124**: 22 (1938); **132**: 249 (1941).
(*5*) Seyle, H., Dosne, C., Bassett, L., and Whittaker, J.: On the therapeutic value of adrenal cortical hormones in traumatic shock and allied conditions. Canad. Med. Assoc. J., **43**: 1 (1940).
(*6*) Heuer, G. J., and Andrus, W. De W.: The effect of adrenal cortical extract in controlling shock following the injection of aqueous extracts of closed intestinal loops. Ann. Surg., **100**: 734 (1934).
(*7*) Wolfram, J., and Zwemer, R. L.: Cortin protection against anaphylactic shock in guinea pigs. J. Exp. Med., **61**: 9 (1935).
(*8*) Perla, D., Freidman, D. G., Sandberg, M., and Greenberg, S. S.: Prevention of histamine and surgical shock by cortical hormone and saline. Proc Soc. Exp. Biol. and Med., **43**: 397 (1940).
(*9*) Goodman, L., and Gilman, A.: The Pharmacological Basis of Therapeutics. The Macmillan Co., New York, 1941.
(*10*) Amberg, S., and Helmholtz, H. F.: The detoxifying action of sodium salt on potassium salt in the guinea pig. J. Pharm. and Exp. Therap., **12**: 19 (1918).
(*11*) Goodner, K., Horsfall, F. L., Jr., and Dubos, R. J.: Type-specific antipneumococcic rabbit serum for therapeutic purposes. J. Immunol , **33**: 279 (1937).
(*12*) (a) Scudder, J.: Shock: Blood Studies as a Guide to Therapy. J. B. Lippincott Co., Philadelphia, 1940.
(b) Zwemer, R. L., and Scudder, J.: Blood potassium during experimental shock. Surgery, **4**: 510 (1938).
(*13*) Wiggers, C. J.: The present status of the shock problem. Physiol. Rev., **22**: 74 (1942).
(*14*) Andrus, W. De W.: Present concepts of the origin and treatment of traumatic shock. Internat. Abst. of Surg. *in* Surg., Gyn. and Obstet., **75**: 161 (1942).

AMERICAN AND AUSTRALIAN Q FEVERS: PERSISTENCE OF THE INFECTIOUS AGENTS IN GUINEA PIG TISSUES AFTER DEFERVESCENCE [1]

By R. R. PARKER, *Director, Rocky Mountain Laboratory*, and EDWARD A. STEINHAUS, *Associate Bacteriologist, United States Public Health Service*

Davis and Cox (*1*) have reported that in isolated tests testicular washings from guinea pigs inoculated with *Rickettsia diaporica*, the causative agent of American Q fever, were found infectious 6 days after defervescence, the spleen 6, 22, and 23 days, and lymph nodes, brain, and liver 23 days; also a urine sample taken from the bladder at time of death was infectious (time not given).

Additional experiments relating to the persistence of the infectious agent of American Q fever in guinea pig tissues and similar but somewhat more comprehensive ones concerning the same phenomenon in the possibly identical Australian Q fever (*R. burneti*) are reported in this paper. Only male animals were used. In these experiments successive pairs of guinea pigs were sacrificed at various intervals after inoculation and the tissues selected for test were transferred to two fresh ones, each of which received 1 cc. of a saline suspension intraperitoneally. Urine, which was drawn from the bladder at autopsy, was used in 1 cc. amounts or less, depending on the quantity available. The immunity of each of the four recipients was challenged with the homologous rickettsia on or shortly after the twentieth day after inoculation. A febrile period following the tissue or urine inoculation and complete absence of fever after the immunity test was considered as evidence that infection had occurred.

EXPERIMENT 1.—AMERICAN Q FEVER

The donor guinea pigs were inoculated subcutaneously. The following tissues were transferred over a period of 54 days after inoculation: spleen, liver, kidney, lung, and brain. The infectious agent was recovered (+) or not recovered (—) as follows:

Tissue	Days after inoculation									
	12	13	14	16	17	18	20	23	26	32
Spleen	+	+	+	+	+	+	+	+	+	+
Liver	+	+	+	+	+	+	+	+	+	—
Kidneys	+	+	+	+	+	+	+	+	+	+
Lungs	+	+	+	+	+	+	+	—	+	—
Brain	+	+	+	+	+	+	+	—	+	—

[1] From the Rocky Mountain Laboratory (Hamilton, Mont.), Division of Infectious Diseases, National Institute of Health.

In this one experiment the two donor guinea pigs for any one date were so selected that both had been afebrile the same number of days. Therefore, the number of days after defervescence corresponds to "days after inoculation," respectively, as follows: 1, 2, 3, 4, 5, 7, 9, 11, 15, 20, and 40.

Another test was made of urine samples taken from guinea pigs sacrificed at intervals up to 45 days. The 5-, 12-, 16-, 20-, 25-, and 36-day samples were positive, an 8-day one uncertain, and the 40- and 45-day tests negative.

In other experiments the rickettsia was recovered from the clots and serums of blood specimens taken at various intervals up to and including the fourth and ninth days after defervescence, respectively, but not through 36 days thereafter.[2]

In a test with field mice (*Microtus* sp.) the spleens of animals sacrificed 4, 6, 8, 10, 14, 18, 24, and 30 days after inoculation were infectious, but not that from a mouse sacrificed on the fortieth day. Later tests were not made.

EXPERIMENT 2.—AUSTRALIAN Q FEVER

The donor guinea pigs were injected intraperitoneally. The following materials were used for transfer: spleen, liver, kidney, testicle, seminal vesicle, and urine. The infectious agent was recovered (+), not recovered (−), or its occurrence questionable (?) as follows:

Test material	Days after inoculation																	
	5	8	11	13	15	20	25	30	35	40	50	60	70	80	90	100	110	120
Spleen	+	+	+	+	+	+	+	+	+	+	?	−	−	−	+	−	+	+
Liver	+	+	+	+	+	+	+	+	+	+	−	−	−	−	−	−	−	−
Kidneys	+	+	+	+	+	+	+	+	+	+	+	+	+	+	[illegible]	+	+	+
Testes [1]			+			+		+		+	[illegible]	?		+		+		
Seminal vesicles	+	+	+	+	+	+	−	+	+	+	[illegible]	+	+	−	+	+	−	−
Urine	+	+	+	+	+	−	+	+	−	+	[illegible]	−	−	−	−	−	+	−

[1] Absence of symbol indicates that no test was made on this day.

The shortest period from inoculation to defervescence was 7 days, the longest 16, and the average 10.33 days.

EXPERIMENT 3.—AUSTRALIAN Q FEVER

This experiment was similar to the second except that the guinea pigs used as donors were inoculated subcutaneously instead of intraperitoneally and lung and brain tissue were also used as test materials.

[2] It was found that the rickettsia persisted for at least 40 days in pooled serums and clotted blood, drawn on the third day of fever, when held at room temperature (23° C.) or in the cold room (7° C.). There was not sufficient material for further tests.

The infectious agent was recovered (+), not recovered (−), or its occurrence questionable (?) as follows:

Test material	Days after inoculation																	
	5	8	11	13	15	20	25	30	35	40	50	60	70	80	90	100	110	120
Spleen	+	+	+	+	+	+	+	+	+	+	+	−	+	−	−	−	−	−
Liver	+	+	+	+	+	+	−	+	+	−	−	+	−	−	−	−	−	−
Kidneys	+	+	+	+	+	+	+	+	+	+	+	+	?	+	+	?	?	?
Testes	+	+	+	+	+	+	+	+	+	+	?	−	−	−	−	−	−	−
Seminal vesicles	+	+	+	+	+	+	+	+	+	+	+	−	+	−	−	−	−	−
Brain	+	+	+	+	+	?	−	−	−	−	−	?	−	−	−	−	−	−
Lungs	+	+	+	+	+	+	+	+	−	−	−	−	−	−	−	−	−	−
Urine	+	+	+	+	+	+	+	+	+	?	+	+	+	−	+	−	?	−

The shortest period from inoculation to defervescence was 7 days, the longest 12, and the average 8.8 days.

TESTS RELATING TO THE POSSIBILITY OF THE TRANSMISSION OF AMERICAN AND AUSTRALIAN Q FEVERS DURING COPULATION

It was determined that guinea pigs injected with the Australian Q fever rickettsia via the urethra and via the vagina were uniformly infected. The inoculum used was a saline suspension of infected guinea pig spleen tissue. Of females similarly injected with seminal vesicle tissue taken from an animal sacrificed 6 days after inoculation with the Australian Q fever rickettsia, 50 percent became infected.

Two other experiments, one with American and the other with Australian Q fever, were made to obtain information relative to the possibility that these diseases may be transmitted from infected male guinea pigs to normal females during mating. In the American Q fever test, nine infected males, febrile 3 to 6 days, were each placed with a virgin female. One female remained afebrile; the others had 1 to several days of fever, apparently due to intercurrent conditions. Six became pregnant. All were susceptible to American Q fever rickettsiae injected 61 days after the sexes were placed together. All six pregnant animals died and four of them aborted 3, 4, 4, and 6 days, respectively (on second, second, and first day of fever, and the day before onset of fever), after receiving the immunity test Only one of the three nonpregnant animals died.

In the corresponding test with the Australian disease 10 virgin females were paired with infected males when the latter had been febrile from 1 to 3 days. As in the preceding experiment most of the females exhibited apparently nonspecific fevers for 1 or more days. Four females became pregnant. Nine females were susceptible when the immunity test was given 55 days after the sexes were paired. The four pregnant animals aborted their young and three died. The young were aborted 4, 8, 10, and 10 days, respectively, after the challenge dose (three on second day of fever, the last on the day before

the onset of fever). Of the five susceptible nonpregnant females none died. One nonpregnant animal remained afebrile following the immunity test. It had been irregularly febrile for a 10-day period beginning 4 days after it had been placed with a male. Evidently this animal became infected while with the male. However, it is not known that mating took place and there is no certainty that infection occurred as a result of copulation.

It is of interest that the aborted fetuses of two of the guinea pigs used in the last experiment were found to be infected. The pooled spleens and livers of the fetuses of each parent were tested in two fresh guinea pigs. All four test animals had typical febrile periods. Three died.

TESTS OF URINE OF RECOVERED AMERICAN Q FEVER PATIENTS

Urine from two patients has been tested. From one there was a single sample taken 72 days after he became afebrile. From the other there were five samples taken 3 days after onset and 1, 9, 15, and 22 days after defervescence, respectively. All six were negative.

DISCUSSION

The data under experiments 1, 2, and 3 show definitely that the rickettsial agents of American and Australian Q fevers may be present in various tissues of guinea pigs for considerable periods after defervescence. In the American Q fever test, which covered a period of only 54 days after inoculation, the rickettsia was recovered from the kidneys for 40 days (the duration of the experiment), from the spleen for 20 days, from the liver, lungs, and brain for 15 days, and from the urine for 18 days after the last day of fever.

The number of each group of four recipient guinea pigs that received suspensions of tissue and urine from the donors is not shown in the tables. However, in general, all four recipients were infected by the materials from donors sacrificed before the twenty-fifth day after inoculation. Thereafter, three, two, or occasionally only one animal became infected except that in the case of kidney tissue, infection usually resulted in all four recipients through the full course of experiments 1 and 3.

In some of the tissue and urine tests, mostly the later ones, two or three of the recipient guinea pigs definitely did not become infected, while the others exhibited reactions which could not be interpreted with certainty. Some of these questionable results were due to animals which had intercurrent infections following the immunity test; other animals concerned had brief periods (1 or 2 days) of low temperature both before and after immunity test, either or neither of which might have been specific. These doubtful results are represented in the tables by question marks.

In the Australian Q fever tests which continued for 120 days after inoculation the rickettsia was found present in the materials tested (using the average days from inoculation to the end of fever) for at least the following periods after defervescence, using the longest period of the two experiments: kidney and spleen, 110 days (the duration of the experiment); liver, 50 days; seminal vesicles and testes, 90 days; brain, 5 days; lungs, 20 days; and in the urine for 100 days.

The data suggest that the rickettsia of the Australian disease is likely to persist longest in the organs of the abdominal cavity and of the urogenital system and to be most consistently present in those of the latter. The end point of persistence was not determined. Presence in the urine was not as consistent as in the kidneys.

The data for the two Australian Q fever tests suggest that, in tissues other than the kidneys, the rickettsia may persist longest when the guinea pigs are inoculated intraperitoneally. However, there is no apparent reason why this should necessarily be true; also, the results are not sufficiently clear-cut to justify a conclusion. The rickettsia was more consistently present in the urine of the animals injected subcutaneously than in those injected intraperitoneally. This suggests that the obtaining of a positive urine sample involves an element of chance.

The persistence of the rickettsia of Australian Q fever in the seminal vesicles suggested the possibility that infected males might transmit the disease to normal females during copulation. Of the nine tests made with American Q fever and 10 with Australian Q fever to obtain information on this point, only one female became infected while with a male, but there is no evidence that this infection resulted from copulation. Data from these tests suggest the possibility that both diseases affect pregnant animals more severely.

REFERENCE

(1) Davis, Gordon E., and Cox, Herald R.: A filter-passing infectious agent isolated from ticks. I. Isolation from *Dermacentor andersoni*, reactions in animals, and filtration experiments. Pub. Health Rep., 53: 2259–2267 (1938).

INCIDENCE OF HOSPITALIZATION, FEBRUARY 1943

Through the cooperation of the Hospital Service Plan Commission of the American Hospital Association, data on hospital admissions among about 8,000,000 members of Blue Cross Hospital Service Plans are presented monthly. These plans provide prepaid hospital service. The data cover about 60 hospital service plans scattered throughout the country, mostly in large cities.

Item	February—	
	1943	1942
1. Number of plans supplying data	65	60
2. Number of persons eligible for hospital care	9,739,448	8,092,576
3. Number of persons admitted for hospital care	76,661	65,966
4. Incidence per 1,000 persons, annual rate, during current month (daily rate × 365)	102.6	106.3
5. Incidence per 1,000 persons, annual rate for the 12 months ended Feb. 28	108.3	106.7

DEATHS DURING WEEK ENDED MARCH 13, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Mar. 13, 1943	Corresponding week, 1942
Data for 90 large cities of the United States:		
Total deaths	10,105	9,550
Average for 3 prior years	9,251	
Total deaths, first 10 weeks of year	101,721	93,632
Deaths under 1 year of age	722	553
Average for 3 prior years	504	
Deaths under 1 year of age, first 10 weeks of year	7,226	5,713
Data from industrial insurance companies:		
Policies in force	65,392,965	64,963,934
Number of death claims	14,067	13,506
Death claims per 1,000 policies in force, annual rate	11.2	10.8
Death claims per 1,000 policies, first 10 weeks of year, annual rate	10.8	10.2

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 20, 1943

Summary

Of the nine common communicable diseases included in the following tables, the current incidence of only measles, meningococcus meningitis, poliomyelitis, and whooping cough is above the corresponding 5-year (1938–42) medians.

A total of 614 cases of meningococcus meningitis (exclusive of delayed reports of 5 cases in Virginia) was reported for the week. The largest weekly total recorded in any previous year (weekly records are available since 1927) was 367 for the week ended March 1, 1930. Increases were shown during the current week in all of the nine geographic divisions except the East North Central, Mountain, and Pacific. States reporting the largest numbers for the current week are as follows (figures for the preceding week in parentheses): New York, 64 (57); Virginia, 53 (29); Mississippi, 44 (12); Massachusetts, 34 (29); Pennsylvania, 32 (26); New Jersey, 29 (21); California, 29 (36); Texas, 28 (18); Rhode Island, 24 (11); North Carolina, 23 (16).

The incidence rates (annual basis) for the first 11 weeks of the year are higher in each of the nine geographic divisions than the corresponding average rates for the 6-year period 1937–1942, ranging from 2.6 times as high in the East South Central to 13.3 times as high in the New England States. The rate for the total (4,659 cases) for the first 11 weeks of 1943 is 16.8 per 100,000 population, which is 5.4 times the average rate for the 6-year period. The highest average rate for the first 11 weeks during the 6-year period was recorded for the East South Central area.

There were 26 cases of poliomyelitis reported (no more than 3 cases in any one State), as compared with a median of 16. The total number of smallpox cases reported was 36, 10 of which were in North Carolina and 8 in Illinois. The corresponding 5-year median is 76.

A total of 9,838 deaths was recorded for the week in 88 large cities of the United States, as compared with 10,054 in the same cities for the preceding week and a 3-year average of 8,964. The cumulative total during the first 11 weeks of the year is 110,978, as compared with 101,960 in the corresponding period of 1942.

Telegraphic morbidity reports from State health officers for the week ended March 20, 1943, and comparison with corresponding week of 1942, and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42
	Mar. 20, 1943	Mar. 21, 1942		Mar. 20, 1943	Mar. 21, 1942		Mar. 20, 1943	Mar. 21, 1942		Mar. 20, 1943	Mar. 21, 1942	
NEW ENG.												
Maine	0	1	1	------	3	4	9	173	173	12	4	0
New Hampshire	0	0	0	------	------	------	13	10	18	0	0	0
Vermont	0	0	0	------	------	------	310	15	18	3	0	0
Massachusetts	5	1	2	------	------	------	1,394	830	811	34	3	2
Rhode Island	1	1	0	------	1	------	14	171	9	24	0	0
Connecticut	0	0	1	3	2	4	418	413	156	3	5	1
MID. ATL.												
New York	21	26	26	[1] 8	[1] 11	[1] 33	2,321	683	1,408	64	22	3
New Jersey	3	4	5	15	16	23	1,467	443	443	29	5	1
Pennsylvania	10	18	18	3	------	------	2,851	1,087	1,087	32	2	6
E. NO. CEN.												
Ohio	5	7	12	20	22	22	732	196	196	6	1	2
Indiana	2	7	11	3	57	57	403	125	125	5	0	1
Illinois	6	20	21	13	41	41	963	645	645	18	5	3
Michigan [2]	8	7	8	27	4	23	555	246	248	7	1	1
Wisconsin	1	2	2	40	38	200	1,131	871	871	4	0	1
W. NO. CEN.												
Minnesota	3	3	3	------	5	5	94	947	179	3	1	0
Iowa	0	1	3	------	4	28	332	402	175	0	0	0
Missouri	6	2	9	8	1	16	375	325	151	27	0	0
North Dakota	0	1	2	1	------	44	131	64	28	1	0	0
South Dakota	0	3	0	2	------	2	52	4	4	0	0	0
Nebraska	0	4	2	24	11	11	249	304	53	2	0	1
Kansas	5	3	3	6	9	22	513	415	533	5	1	0
SO. ATL.												
Delaware	2	1	1	------	------	------	36	8	8	3	0	0
Maryland [2]	11	10	5	4	5	41	73	890	170	25	9	1
Dist. of Col.	0	0	6	5	5	4	100	83	39	3	1	0
Virginia	7	10	14	792	382	552	779	290	376	[3] 58	5	3
West Virginia	3	2	6	68	257	218	36	148	148	3	0	1
North Carolina	8	10	13	77	28	28	77	1,362	1,286	23	2	1
South Carolina	3	1	5	840	505	754	190	257	257	18	0	0
Georgia	4	4	9	152	119	144	187	450	421	9	0	1
Florida	4	3	6	10	20	9	62	185	185	17	2	0
E. SO. CEN.												
Kentucky	6	5	5	5	6	69	1,054	91	91	12	2	2
Tennessee	7	6	6	93	71	161	341	140	165	8	2	2
Alabama	5	7	7	158	440	335	226	349	349	10	0	3
Mississippi [2]	5	12	8	------	------	------	------	------	------	44	1	1
W. SO. CEN.												
Arkansas	12	5	7	99	226	291	102	235	235	5	0	0
Louisiana	6	7	7	13	3	27	232	188	61	13	1	1
Oklahoma	7	11	6	190	213	213	65	376	126	2	0	1
Texas	34	50	36	1,543	1,228	1,361	1,160	2,363	811	28	10	1
MOUNTAIN												
Montana	2	3	3	24	33	11	343	87	31	0	0	0
Idaho	0	2	0	------	------	2	126	81	44	2	0	0
Wyoming	0	0	0	46	192	------	177	95	29	0	0	0
Colorado	7	8	10	46	74	44	717	247	247	0	0	0
New Mexico	0	2	4	1	5	7	20	66	66	1	0	0
Arizona	4	0	1	68	209	209	47	365	95	1	1	0
Utah [2]	1	0	0	8	5	8	466	155	155	7	0	0
Nevada	0	0	------	21	3	------	27	4	------	1	0	------
PACIFIC												
Washington	3	2	2	1	9	9	947	322	322	9	1	1
Oregon	0	4	4	25	28	31	491	167	167	9	2	0
California	23	17	26	74	217	211	742	5,148	609	29	2	2
Total	240	293	315	4,536	4,508	6,366	23,150	22,521	22,521	[3] 619	91	54
11 weeks	3,191	3,542	4,379	49,953	54,130	85,103	159,593	158,613	158,613	4,659	752	587

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 20, 1943, and comparison with corresponding week of 1942, and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42
	Mar. 20, 1943	Mar. 21, 1942		Mar. 20, 1943	Mar. 21, 1942		Mar. 20, 1943	Mar. 21, 1942		Mar. 20, 1943	Mar. 21, 1942	
NEW ENG.												
Maine	0	0	0	20	11	11	0	0	0	0	0	0
New Hampshire	0	0	0	6	12	3	0	0	0	0	0	0
Vermont	0	0	0	8	11	8	0	0	0	0	0	0
Massachusetts	0	1	0	592	330	169	0	0	0	1	1	1
Rhode Island	1	0	0	20	8	10	0	0	0	0	0	0
Connecticut	0	1	0	69	44	89	0	0	0	1	0	0
MID. ATL.												
New York	1	0	0	655	548	673	0	0	0	8	3	3
New Jersey	2	0	0	183	197	197	0	0	0	0	0	1
Pennsylvania	2	0	0	342	572	436	0	0	0	9	8	6
E. NO. CEN.												
Ohio	0	0	1	327	374	343	5	0	0	3	2	2
Indiana	0	2	0	117	153	191	1	0	5	1	0	1
Illinois	2	1	0	224	269	516	8	2	10	2	1	2
Michigan [2]	0	0	0	96	259	383	0	2	3	1	1	1
Wisconsin	3	1	1	335	191	172	1	0	4	0	0	1
W. NO. CEN.												
Minnesota	0	0	0	62	113	105	0	2	5	0	0	1
Iowa	0	0	0	94	47	65	1	0	4	1	1	1
Missouri	2	1	0	138	76	86	0	10	10	0	1	2
North Dakota	0	1	0	7	32	28	0	0	3	0	0	0
South Dakota	0	0	0	15	39	12	1	0	1	0	0	0
Nebraska	0	1	0	36	50	25	0	1	1	0	0	0
Kansas	0	0	0	64	125	125	2	1	1	1	0	0
SO. ATL.												
Delaware	0	0	0	6	51	17	0	0	0	0	0	0
Maryland [3]	0	0	0	112	85	47	0	0	0	7	1	1
Dist. of Col.	0	0	0	16	16	18	0	0	0	0	0	0
Virginia	1	0	0	53	28	36	0	0	0	2	2	2
West Virginia	0	1	0	24	41	50	0	0	0	2	2	2
North Carolina	0	0	0	28	45	41	10	0	0	5	1	0
South Carolina	0	0	0	8	5	4	0	0	0	0	0	1
Georgia	0	0	0	6	20	14	0	0	0	2	4	3
Florida	1	0	0	11	4	6	0	0	0	5	3	3
E. SO. CEN.												
Kentucky	1	0	0	49	135	100	0	0	0	0	5	2
Tennessee	0	0	0	51	75	75	0	2	1	0	2	2
Alabama	0	1	1	18	29	23	1	2	0	1	1	2
Mississippi [2]	2	0	0	7	29	5	0	0	1	0	1	1
W. SO. CEN.												
Arkansas	0	0	1	7	6	7	3	4	3	3	2	3
Louisiana	0	2	1	11	4	11	1	0	1	1	3	9
Oklahoma	0	0	0	27	21	21	0	0	14	1	1	1
Texas	3	0	1	65	50	71	0	14	14	6	4	7
MOUNTAIN												
Montana	0	0	0	6	23	26	0	0	0	0	0	0
Idaho	0	1	0	12	6	11	0	0	0	0	0	1
Wyoming	0	0	0	40	27	10	0	0	0	0	0	0
Colorado	0	0	0	103	42	51	1	0	1	0	0	0
New Mexico	0	0	0	1	2	13	0	0	0	0	0	0
Arizona	1	0	0	16	6	6	0	0	0	0	1	1
Utah [2]	0	0	0	57	32	29	0	0	0	0	0	0
Nevada	0	0	-----	6	0	-----	0	0	-----	0	0	-----
PACIFIC												
Washington	1	0	0	46	37	46	0	0	0	1	2	2
Oregon	1	0	0	6	10	24	0	0	2	0	3	2
California	2	2	2	158	136	193	1	0	2	3	7	5
Total	26	16	16	4,360	4,426	5,029	36	40	76	67	63	88
11 weeks	304	266	266	42,593	44,084	51,089	302	246	810	585	842	842

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 20, 1943, and comparison with corresponding week of 1942, and 5-year median—Con.

Division and State	Whooping cough			Week ended March 20, 1943								
	Week ended		Median 1938–42	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt spotted fever	Tularemia	Typhus fever
	Mar. 20, 1943	Mar 21, 1942			Amebic	Bacillary	Unspecified					
NEW ENG.												
Maine	67	16	32	0	0	0	0	0	0	0	0	0
New Hampshire	1	6	5	0	0	0	0	0	0	0	0	0
Vermont	23	43	42	0	0	0	0	0	0	0	0	0
Massachusetts	166	269	171	0	0	2	0	1	0	0	0	0
Rhode Island	34	38	22	0	0	0	0	1	0	0	0	0
Connecticut	65	86	66	0	1	0	0	1	0	0	0	0
MID. ATL.												
New York	423	527	404	3	14	2	0	2	0	0	0	0
New Jersey	206	268	163	1	1	0	0	0	0	0	0	0
Pennsylvania	369	220	225	0	0	8	0	0	0	0	0	0
E. NO. CEN.												
Ohio	233	116	199	0	0	0	0	1	0	0	0	0
Indiana	72	45	39	0	0	0	0	0	0	0	0	0
Illinois	153	124	94	0	0	0	0	0	0	0	0	0
Michigan [2]	253	147	188	0	0	1	0	0	0	0	0	0
Wisconsin	209	182	140	0	0	0	0	0	0	0	0	0
W. NO. CEN.												
Minnesota	54	25	27	0	2	0	0	0	0	0	0	0
Iowa	18	15	15	0	0	0	0	0	0	0	0	0
Missouri	22	9	40	0	0	0	0	0	0	0	3	0
North Dakota	12	1	4	0	0	0	0	0	0	0	0	0
South Dakota	1	2	2	0	0	0	0	0	0	0	1	0
Nebraska	11	7	6	0	0	0	0	0	0	0	0	0
Kansas	61	42	57	0	0	1	0	0	0	0	0	0
SO. ATL.												
Delaware	1	0	5	0	0	0	0	0	0	0	0	0
Maryland [2]	120	35	70	0	0	0	3	0	0	0	0	0
Dist. of Col	26	15	15	0	0	0	0	0	0	0	0	0
Virginia	55	38	80	0	0	0	75	0	0	0	0	0
West Virginia	55	25	46	0	0	0	0	0	0	0	0	0
North Carolina	163	127	340	0	0	0	0	0	0	0	0	0
South Carolina	43	57	57	0	0	0	0	0	0	0	0	0
Georgia	36	32	51	0	0	0	1	0	0	0	4	15
Florida	32	37	18	0	0	1	0	0	0	0	0	8
E. SO. CEN.												
Kentucky	35	82	51	0	0	0	0	0	0	0	0	0
Tennessee	122	33	40	0	0	0	0	0	0	0	5	0
Alabama	49	23	31	0	0	0	0	0	0	0	0	1
Mississippi [2]	------	------	------	0	0	0	0	0	0	0	0	0
W. SO. CEN.												
Arkansas	42	10	11	0	1	6	0	0	0	0	0	0
Louisiana	8	19	19	0	4	0	0	0	0	0	1	3
Oklahoma	23	15	15	0	0	0	0	0	0	0	0	0
Texas	420	117	208	0	7	124	0	4	0	0	2	10
MOUNTAIN												
Montana	12	10	10	0	0	0	0	0	0	1	0	0
Idaho	0	2	19	0	0	0	0	0	0	0	0	0
Wyoming	1	10	3	0	0	0	0	0	0	0	0	0
Colorado	29	36	36	0	0	0	0	0	0	0	0	0
New Mexico	41	9	16	0	0	0	0	0	0	0	0	0
Arizona	23	81	20	0	0	0	11	2	0	0	0	0
Utah [2]	40	87	87	0	0	0	0	0	0	0	0	0
Nevada	0	3	------	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	25	115	84	0	0	0	0	0	0	0	0	0
Oregon	10	39	28	0	0	0	0	0	0	0	0	0
California	318	286	286	0	1	5	0	1	0	0	0	0
Total	4,183	3,531	4,024	4	31	150	90	13	0	1	16	37
11 weeks	42,972	43,609	44,995	------	------	------	------	------	------	------	------	------

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Delayed report of 5 cases in Virginia included.

WEEKLY REPORTS FROM CITIES

City reports for week ended March 6, 1943

This table lists the reports from 90 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga	0	0	48	1	12	0	7	0	0	0	0	1
Baltimore, Md	2	0	3	1	24	15	21	0	41	0	1	83
Barre, Vt	0	0	-----	0	0	0	0	0	0	0	0	0
Billings, Mont	0	0	---	0	0	0	0	0	1	0	0	0
Birmingham, Ala	0	0	1	2	0	1	12	0	2	0	0	0
Boise, Idaho	0	0	------	0	0	0	0	0	0	0	0	0
Boston, Mass	0	0	------	0	174	6	21	1	127	0	0	38
Bridgeport, Conn	0	0	------	0	1	1	2	0	8	0	0	0
Brunswick, Ga	0	0	------	0	1	0	0	0	0	0	0	0
Buffalo, N. Y	1	0	------	0	73	2	9	0	8	0	0	7
Camden, N. J	0	0	1	0	37	1	3	0	1	0	0	8
Charleston, S. C	0	0	32	1	0	1	5	0	0	0	0	0
Charleston, W. Va	0	0	3	0	0	0	0	0	3	0	0	0
Chicago, Ill	9	0	4	2	401	7	29	0	67	0	0	59
Cincinnati, Ohio	0	0	-	0	74	2	4	0	20	0	0	10
Cleveland, Ohio	0	0	2	0	17	0	11	0	28	0	0	35
Columbus, Ohio	0	0	---	0	10	1	6	0	[illegible]	0	0	2
Concord, N. H	0	0	----	0	0	0	0	0	1	0	0	0
Cumberland, Md	0	0	----	0	0	0	1	0	0	0	0	1
Dallas, Tex	0	0	--	0	0	0	0	0	8	0	0	24
Denver, Colo	3	0	11	1	459	0	5	0	11	0	0	8
Detroit, Mich	3	0	1	2	189	3	18	0	42	0	0	98
Duluth, Minn	0	0	-----	0	1	0	3	0	9	0	0	2
Fall River, Mass	0	0	-----	0	7	0	2	0	7	0	0	16
Fargo, N. Dak	0	0	------	0	1	0	0	0	0	0	0	0
Flint, Mich	0	0	---	0	5	0	0	0	4	0	0	5
Fort Wayne, Ind	0	0	------	0	0	0	4	0	0	0	0	0
Frederick, Md	0	0	------	0	2	0	0	0	0	0	0	0
Galveston, Tex	0	0	------	0	1	0	2	0	3	0	0	0
Grand Rapids, Mich	0	0	------	0	5	0	0	0	3	0	0	15
Great Falls, Mont	1	0	------	0	26	1	2	0	0	0	0	7
Hartford, Conn	0	0	------	0	13	1	7	0	2	0	0	5
Helena, Mont	0	0	----	0	21	0	0	0	0	0	0	0
Houston, Tex	0	0	1	1	7	1	11	0	3	0	0	3
Indianapolis, Ind	0	0	-----	1	132	0	9	0	15	0	0	11
Kansas City, Mo	1	0	------	0	85	4	8	0	57	0	0	1
Kenosha, Wis	0	0	------	0	2	0	0	0	2	0	0	0
Little Rock, Ark	0	0	----	0	3	1	5	0	0	0	0	1
Los Angeles, Calif	3	0	14	1	107	4	10	0	32	0	0	21
Lynchburg, Va	0	0	--	0	0	0	2	0	0	0	0	6
Memphis, Tenn	0	0	2	1	52	4	3	0	4	0	0	7
Milwaukee, Wis	0	0	1	1	373	0	1	0	108	0	0	86
Minneapolis, Minn	2	0	------	1	12	3	6	0	17	0	0	9
Missoula, Mont	0	0	----	0	0	0	0	0	0	0	0	0
Mobile, Ala	0	0	1	0	0	1	4	0	0	0	0	0
Nashville, Tenn	0	0	---	0	77	0	2	0	3	0	0	4
Newark, N. J	0	0	3	0	87	4	4	0	13	0	0	10
New Haven, Conn	0	0	-	0	1	2	0	0	2	0	0	3
New Orleans, La	0	0	5	1	37	0	13	0	5	0	1	0
New York, N. Y	23	0	12	4	333	36	80	2	383	0	8	85
Omaha, Nebr	0	0	-----	0	4	1	6	0	2	0	0	0
Philadelphia, Pa	0	1	4	1	707	13	45	0	75	0	1	78
Pittsburgh, Pa	0	0	6	0	0	4	18	0	10	0	0	34
Portland, Maine	0	0	------	0	0	3	3	0	1	0	0	13
Providence, R. I	0	0	1	0	3	7	4	0	8	0	0	33

City reports for week ended March 6, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Pueblo, Colo	0	0	------	0	1	1	1	0	1	0	0	11
Racine, Wis	0	0	------	0	23	0	1	0	36	0	0	1
Raleigh, N. C	0	0	------	0	0	0	1	0	0	0	0	0
Reading, Pa	0	0	------	0	153	1	2	0	1	0	1	16
Richmond, Va	0	0	4	2	12	2	1	0	6	0	0	2
Roanoke, Va	0	0	------	0	0	0	3	0	0	0	0	0
Rochester, N. Y	0	0	------	1	20	1	6	0	10	0	1	26
Sacramento, Calif	2	0	1	1	15	0	2	0	5	0	0	0
St. Joseph, Mo	0	0	------	0	1	0	1	0	0	0	0	0
St. Louis, Mo	1	0	2	0	35	11	23	0	18	0	0	3
St Paul, Minn	0	0	------	0	2	1	5	0	5	0	0	56
Salt Lake City, Utah	0	0	------	2	79	2	2	0	20	0	0	18
San Antonio, Tex	1	0	2	2	3	0	13	0	1	0	0	3
San Francisco, Calif	2	0	1	1	91	5	10	1	11	0	0	23
Savannah, Ga	0	0	22	0	1	4	2	0	0	0	0	3
Seattle, Wash	1	0	------	0	100	0	6	0	6	0	0	7
Shreveport, La	1	0	------	0	0	0	5	0	0	0	0	0
South Bend, Ind	0	0	------	0	13	0	0	0	1	0	0	1
Spokane, Wash	0	0	------	0	146	0	3	0	3	0	0	1
Springfield, Ill	0	0	------	0	3	0	4	0	3	0	0	30
Springfield, Mass	0	0	------	0	8	0	1	0	73	0	0	0
Superior, Wis	0	0	------	0	4	0	0	0	2	0	0	1
Syracuse, N. Y	0	0	------	0	31	3	2	0	9	0	0	40
Tacoma, Wash	0	0	------	0	28	0	0	0	3	0	0	0
Tampa, Fla	0	0	------	0	0	0	1	0	0	0	0	0
Terre Haute, Ind	0	0	------	0	12	1	0	0	0	0	0	0
Topeka, Kans	0	1	------	0	77	0	2	0	0	0	0	9
Trenton, N J	0	0	1	1	39	0	8	0	7	0	0	1
Washington, D. C	2	0	------	1	116	4	12	0	26	0	0	22
Wheeling, W. Va	0	0	------	0	2	0	0	0	0	0	0	1
Wichita, Kans	0	0	3	1	31	0	4	0	3	0	0	2
Wilmington, Del	0	0	------	0	13	1	4	0	2	0	0	12
Wilmington, N. C	0	0	------	0	5	0	5	0	4	0	0	5
Winston-Salem, N. C	0	0	1	0	0	0	2	0	0	0	0	35
Worcester, Mass	0	0	------	0	245	0	12	0	11	0	0	6
Total	58	2	193	40	4,975	167	555	4	1,415	0	8	1,164
Corresponding week 1942	73	7	294	52	3,903	29	540	3	1,492	1	15	1,112
Average, 1938-42	103	------	638	[1] 73	[2] 4,383	------	[1] 564	------	1,565	17	20	1,076

Anthrax.—Cases: Chicago, 1, Wilmington, Del, 1.
Dysentery, amebic.—Cases: Los Angeles, 2, New York, 14.
Dysentery, bacillary.—Cases: Buffalo, 2, Dallas, 1; Detroit, 1; Los Angeles, 4; New York, 3; St. Louis, 1.
Dysentery, unspecified.—Cases: San Antonio, 2; Worcester, 1.
Rocky Mountain spotted fever.—Cases: St. Louis, 1.
Tularemia.—Cases. New Orleans, 1.
Typhus fever.—Cases. Baltimore, 1; New York, 1.

[1] 3-year average, 1940-42.
[2] 5-year median.

PLAGUE INFECTION IN TACOMA, WASH.

Plague infection has been reported proved in tissue and fleas from rats, *R. norvegicus*, collected in Tacoma, Wash., as follows: In a pool of 65 fleas from 36 rats and another pool of 70 fleas from 42 rats taken from frame buildings in industrial sections on February 22 and

March 1, respectively; in tissue from 1 rat taken on February 27 from a frame building in a residential and commercial section.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (human).—1 death from plague (human) was reported on March 5, 1943, in Hamakua District, Island of Hawaii, T. H. All necessary precautions have been taken.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 20, 1943.—During the week ended February 20, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	3	15	2	142	283	42	20	24	69	600
Diphtheria	1	13	8	33		10	2			67
Dysentery (bacillary)				3						3
German measles				10	29	2	18	2	3	64
Influenza		24	9		16	9			66	124
Measles		3	2	172	153	46	233	4	75	688
Meningitis, meningococcus				8	6		1	2	1	18
Mumps	1	177	4	190	1,017	112	102	119	199	1,921
Poliomyelitis			1			2				3
Scarlet fever		13	5	151	129	19	17	24	29	390
Tuberculosis (all forms)	1	7	2	122	50	7	1	17	28	235
Typhoid and paratyphoid fever				18	1		1			20
Whooping cough		6		147	99	20	6	38	15	331

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January-December 1942	January 1943	February 1943—week ended— 6	13	20	27
ASIA							
Ceylon	C	103	25	11			
China:							
Kunming (Yunnanfu)	C	[1]804					
Shanghai	C	809					
India	C	166,441	12,596				
Calcutta	C	2,331	188	22	28		
Chittagong	C	55					
Madras	C	84	772	83	43		
Rangoon	C	1					
Vizagapatam	C	13	4				
India (French)	C	14					
Pondichery	C	1					

[1] For the period May 12 to July 4, 1942.

PLAGUE

[C indicates cases; D, deaths; P, present]

Place		January-December 1942	January 1943	February 1943—week ended— 6	13	20	27
AFRICA							
Basutoland	C	10					
Belgian Congo	C	4					
British East Africa:							
Kenya	C	731	8		1		
Nairobi	C	67					
Uganda	C	346					
Egypt: Port Said	C	3					
Madagascar	C	99	11				
Morocco	C	362	4				
Rhodesia (Northern)	C	15					
Senegal	C	[1] 6					
Union of South Africa	C	94	31				
ASIA							
China [2]							
India	C	1,239	104	32			
Indochina (French)	C	81					
Palestine:							
Haifa	C	5					
Jaffa	C	[3] 7	[3] 6				
EUROPE							
Portugal: Azores Islands	C	1					
NORTH AMERICA							
Canada: Alberta Province—Plague-infected fleas		P					
SOUTH AMERICA							
Argentina: Cordoba Province	C	28					
Brazil:							
Alagoas State	C	3					
Pernambuco State	C	6					
Chile: Valparaiso	C	1					
Ecuador:							
Chimborazo Province	D	1					
Loja Province	C	4					
Peru:							
Ancash Department	C	8					
Lambayeque Department	C	3					
Liberatad Department	C	9					
Salaverry—Plague-infected rats		P					
Lima Department	C	57					
Lima	C	18					
Piura Department	C	21					
OCEANIA							
Hawaii Territory: [4] Plague-infected rats		122	11			15	
New Caledonia	C	[5] 2					

[1] Includes 4 suspected cases.

[2] Plague has been reported in China as follows: Chekiang Province, Apr. 1–10, 1942, 4 cases; Fukien Province, Jan. 1–Apr. 5, 1942, plague appeared in 11 localities; Hunan Province, week ended Apr. 18, 1942, 2 cases; Suiyuan Province, pneumonic plague appeared in epidemic form during the period Jan. 1–Apr. 4, 1942, in the northwestern area.

[3] At Jaffa and vicinity.

[4] During the week ended Mar. 6, 1943, 1 death from plague (human) was reported in Hamakua district, T. H., no other location being given.

[5] Pneumonic.

SMALLPOX

[C indicates cases]

Place		January-December 1942	January 1943	February 1943—week ended— 6	13	20	27
AFRICA							
Algeria	C	814	8				
Angola	C	49					
Basutoland	C	57					
Belgian Congo	C	1,132	61	21	59		
British East Africa: Tanganyika	C	84					
Dahomey	C	56	12				
Egypt	C		1				
French Equatorial Africa	C	2					
French Guinea	C	138	6				
Gold Coast	C	1,423	2				
Ivory Coast	C	71					
Morocco	C	1,558	13	3			
Nigeria	C	2,533	324				
Niger Territory	C	986	1				
Portuguese East Africa	C	51					
Rhodesia:							
Northern	C	9					
Southern	C	1					
Senegal	C	17					
Sierra Leone	C	1					
Sudan (French)	C	296	59				
Tunisia	C	1					
Union of South Africa	C	1,448					
Zanzibar	C	[1] 2					
ASIA							
Ceylon	C	7					
China	C	9					
India	C	30,219	1,219				
Indochina (French)	C	3,729					
Iran	C	194					
Iraq	C	307	14				
Palestine	C	10	11	4			
Syria and Lebanon	C	1,983	324				
Trans-Jordan	C	3					
EUROPE							
France:							
Seine Department	C	44					
Unoccupied zone	C	13					
Great Britain:							
England and Wales	C	5					
Scotland	C	89	1				
Ireland (Northern)	C	1					
Irish Free State	C	12					
Portugal	C	56	4	2			
Spain	C	211	56				
Turkey	C	1,841	1,176				
NORTH AMERICA							
Canada	C	5	1				
Guatemala	C	7					
Mexico	C	134	7				
Panama Canal Zone	C	[2] 1					
SOUTH AMERICA							
Argentina	C	169					
Brazil	C	3	12	1	1		
Colombia	C	615	14				
Ecuador	C	6	1				
Peru	C	1,152	3				
Venezuela (alastrim)	C	159	1				

[1] Imported. [2] In the Canal Zone. [3] Deaths.

TYPHUS FEVER

[C indicates cases]

Place		January-December 1942	January 1943	February 1943—week ended— 6	13	20	27
AFRICA							
Algeria	C	35,205	8		[1] 419		
Basutoland	C	34					
Belgian Congo	C		1				
British East Africa: Kenya	C	23	2				
Egypt	C	23,545	2,473				
Gold Coast	C		1				
Ivory Coast	C	4					
Morocco	C	25,846	67	24			
Nigeria	C	5					
Niger Territory	C	1					
Rhodesia (Northern)	C	[2] 1					
Senegal	C	3					
Sierra Leone	C	7					
Tunisia	C	16,295					
Union of South Africa	C	1,728	45				
ASIA							
Afghanistan	C	2,439			[3] 400	120	
China	C	369					
India	C	7	2	7			
Indochina	C	11					
Iran	C	902					
Iraq	C	105	13				
Palestine	C	206	13				
Syria and Lebanon	C	27	3				
Trans-Jordan	C	8					
EUROPE							
Bulgaria	C	709	99				
Czechoslovakia	C	17					
France							
Seine Department	C	1					
Unoccupied zone	C	229					
Germany	C	[4] 2,043					
Great Britain	C	1					
Hungary	C	827	60	7		[5] 25	
Irish Free State	C	29					
Portugal	C	1					
Rumania	C	3,992	225				[6] 982
Slovakia	C	6	[7] 30	[5] 15	17		
Spain	C	3,870	56				
Canary Islands	C	1					
Switzerland	C	3					
Turkey	C	427	167				
Union of Soviet Socialist Republics	C	67					
NORTH AMERICA							
Guatemala	C	251	71				
Jamaica	C	53	2	2			
Mexico	C	978	110				
Panama Canal Zone	C	1					
Puerto Rico	C	4					
SOUTH AMERICA							
Chile	C	128	7				
Colombia	C	70					
Ecuador	C	171	31		5		
Peru	C	923					
Venezuela	C	25					
OCEANIA							
Australia	C	42	2	2			
Hawaii Territory	C	49	3				

[1] For the period Feb. 1-10, 1943.
[2] Suspected.
[3] For the approximate period Jan. 8 to Feb. 13, 1943.
[4] In German territory as of 1919.
[5] For 2 weeks.
[6] For the month of February 1943.
[7] For 3 weeks.

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January-December 1942	January 1943	February 1943—week ended— 6	13	20	27
AFRICA							
Belgian Congo: Libenge	D	[1] 2					
British East Africa Kenya	C	1					
French West Africa	C	1					
Gold Coast	C	[2] 3					
Ivory Coast	C	[2] 7					
Nigeria	C	2					
Senegal [3]	D	1					
Sierra Leone Freetown	C	2					
Sudan (French)	D	[1] 2					
Togo	C	2					
SOUTH AMERICA							
Bolivia:							
Chuquisaca Department	D	1					
La Paz Department	C	7					
Santa Cruz Department	C	18					
Brazil.							
Acre Territory	D	4					
Bahia State	D	1					
Para State	D	1					
Colombia							
Boyaca Department	D	5					
Cundinamarca Department	D	4					
Intendencia of Meta	D	5	1	1			
Santander Department	D	4					
Venezuela: Bolivar State	C	2					

[1] Includes 1 suspected case

[2] Includes 2 suspected cases

[3] According to information dated Feb. 9, 1942, 15 deaths from yellow fever among Europeans have occurred in Senegal.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

[illegible]s PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

THE PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world, (2) articles relating to the cause, prevention, and control of disease, (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

OLUME 58 APRIL 2, 1943 NUMBER 14

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol. 58 • APRIL 2, 1943 • *No. 14*

DISTRIBUTION OF HEALTH SERVICES IN THE STRUCTURE OF STATE GOVERNMENT*

CHAPTER X—STATE HEALTH DEPARTMENT ORGANIZATION

By JOSEPH W. MOUNTIN, *Assistant Surgeon General*, and EVELYN FLOOK, *United States Public Health Service*

All previous chapters in this series of discussions* dealing with provisions made by State governments for the numerous services now accepted as being significant in the improvement of personal and community health have followed a more or less uniform plan insofar as presentation of the material is concerned. That is, some particular

*From the States Relations Division. This is the tenth and final chapter of the third edition of Public Health Bulletin No. 184. It was originally planned to include a summary article, a large part of which would be devoted to reproduction of the schedule developed for collection of this material and the instructions governing its use. However, demands—growing out of he war effort—upon the time of the authors, together with limitations placed on printing, have made impractical complete realization of the original plan Previous chapters are:

Mountin, Joseph W., and Flook, Evelyn: Distribution of health services in the structure of State government—Chapter I. The composite pattern of State health services. Pub. Health Rep., 56:1673 (August 22, 1941). Reprint No. 2306.

Mountin, Joseph W., and Flook, Evelyn: Distribution of health services in the structure of State government—Chapter II. Communicable disease control by State agencies. Pub. Health Rep., 56:2233 (November 21, 1941). Reprint No. 2334.

Mountin, Joseph W., and Flook, Evelyn: Distribution of health services in the structure of State government—Chapter III. Tuberculosis control by State agencies. Pub. Health Rep., 57:65 (January 16, 1942). Reprint No. 2348.

Mountin, Joseph W., and Flook, Evelyn: Distribution of health services in the structure of State government—Chapter IV. Venereal disease control by State agencies. Pub. Health Rep., 57:553 (April 17, 1942). Reprint No. 2360.

Mountin, Joseph W., and Flook, Evelyn: Distribution of health services in the structure of State government—Chapter V. Sanitation by State agencies. Pub. Health Rep., 57:885 (June 12, 1942) and 57:917 (June 19, 1942). Reprint No. 2386.

Mountin, Joseph W., and Flook, Evelyn: Distribution of health services in the structure of State government—Chapter VI. Medical and dental care by State agencies. Pub. Health Rep., 57:1195 (August 14, 1942) and 57:1235 (August 21, 1942). Reprint No. 2395.

Mountin, Joseph W., and Flook, Evelyn: Distribution of health services in the structure of State government—Chapter VII. Maternity-child health activities by State agencies. Pub. Health Rep, 57:1791 (November 27, 1942). Reprint No. 2425.

Mountin, Joseph W., and Flook, Evelyn: Distribution of health services in the structure of State government—Chapter VIII. Industrial health activities by State agencies. Pub. Health Rep., 58:33 (January 8, 1943). Reprint No. 2439.

Mountin, Joseph W., and Flook, Evelyn. Distribution of health services in the structure of State government—Chapter IX. Central State services affecting all branches of public health work. Pub. Health Rep., 58:249 (February 12, 1943). Reprint No. 2448.

segment of public health was the basis of consideration, and the aggregate State effort toward solving the problems involved was described by tracing throughout the entire structure of State government the scope of all official activities pertaining thereto. Identity of each agency was established, together with its functional relationship to the health problem in question. Finally, in each instance, a rough approximation was given of the cost of the services described. At no time were the services of any one agency featured above that of any other except as the difference in function and performance warranted. In other words, since it was known that dispersion rather than concentration of responsibility characterizes State organization for certain health services, it has been the sustained objective to picture the over-all distribution of authority and service rather than to restrict consideration to the work of the official State health agency alone.

A review of the nine chapters which cover the complete list of health activities investigated impresses one with the variation that exists among the States with respect to assignment of responsibility for activities significant to the promotion, conservation, or restoration of health. At the same time, it is emphasized that for most activities, with the exception of medical and institutional care, the health department is the principal agency charged with health work; furthermore, that where several agencies are involved, the health department usually carries the major portion of the program or assumes leadership in promotion and guidance of the over-all plan. In some instances, it even initiates service on a voluntary basis because—for one reason or another—the agency officially responsible is inactive. Because of these circumstances, it was decided that more detailed analysis of the internal organization of health departments is essential to the completion of this study. Consequently, the present chapter—which is the final one of the series—will be devoted to a description of health department organization, with some reference to number and professional classification of personnel employed and to operating expenditures.

From the standpoint of organization, official State health agencies may be described in three distinct parts—the policy-forming and/or advisory body, the chief executive officer, and the State health department. The policy-forming and/or advisory body is variously designated as the State board of health, the State committee of public health, the public health council, or the advisory health board. The chief executive officer may be referred to as the State health officer, the superintendent of health, the executive secretary of the State board of health, the director of public health, or the State health commissioner. The State health department is the administrative branch of the organization. It is divided into bureaus, divisions,

units, or services—each headed by a chief or director who is responsible for administration of a specific program delegated thereto. For the most part, the chief executive officer and members of the health department staff are full-time employees of the State and serve on a salary basis. Members of the State board of health or advisory council, on the other hand, meet with specified frequency or as occasions demand and are compensated only for their expenses and, in a nominal way, for the time spent on official duty.

For expediency in discussion, the chief executive officer of the State health department will be referred to as the State health officer, and the policy-forming and/or advisory body, as the State board of health. However, from table 1 may be determined the official designation of each in all States, the District of Columbia, the Territories, and the Virgin Islands. The method by which each is appointed is recorded, likewise. This table also denotes the composition of each State [1] board of health.

---

[1] The term "State" as used in the discussion which follows includes the States, the Territories, the District of Columbia, and the Virgin Islands.

Table 1.—*Official designation of the chief executive officer of the State health department and the policy-forming and/or advisory body, and method of appointment of each*

State	Chief executive officer of State health department		Policy-forming and/or advisory body	
	Official designation	Appointed or elected by	Official designation and required membership	Appointed or elected by
Alabama	State health officer	Elected by State committee of public health and approved by State medical association.	State committee of public health—10 members, all physicians.	Elected by State medical association.
Arizona	Superintendent of health	Governor, by and with consent of the senate.	State board of health—3 members, Governor, attorney general, and superintendent of health.	Ex-officio membership.
Arkansas	Executive secretary of the State board of health and State health officer.	State board of health, with approval of the Governor.	State board of health—7 members, all physicians.	Governor.
California	Director of public health and executive officer of the State board of health.	Governor	State board of health—8 members, 7 of whom must be physicians and 1 a dentist.	Do.
Colorado	Secretary and executive officer of the State board of health.	State board of health	Colorado State board of health—9 members	Do.
Connecticut	Commissioner of health	Governor	Public health council—6 members, 2 of whom must be physicians and 2 sanitary engineers.	Do.
Delaware	Executive secretary of the State board of health.	State board of health	State board of health—8 members, 4 of whom must be physicians.	Do.
District of Columbia	Health officer of the District of Columbia.	Commissioners of the District of Columbia.	Commissioners of the District of Columbia (2 civilian commissioners and 1 engineer commissioner from the United States Army Engineer Corps).	President of the United States, by and with advice of the United States Senate.
Florida	State health officer	Governor	State board of health—3 members	Governor.
Georgia	Director of State department of health.	State board of health	State board of health—14 members and the Governor who is an ex-officio member. Majority of the board must be physicians, 1 from each congressional district. There must also be 2 dentists and 2 laymen.	Governor. The State medical association nominates 2 physicians from each congressional district, of whom Governor appoints 1. Laymen and dentists appointed by the Governor from the State at large.
Idaho	Director of the division of public health.	Commissioner of public welfare, with approval of the board.	State board of public welfare—5 members	Governor.
Illinois	Director of the department of public health.	Governor, confirmed by the senate	Advisory committee to the director of public health—7 members, all physicians.	Do.
Indiana	State health commissioner and executive officer of the State board of health	Governor	State board of health—5 members	Do.
Iowa	State commissioner of health	Governor, approved by the senate.	State board of health—5 appointive members, physicians, and 5 ex-officio members: Governor, secretary of state, commissioner of health, State treasurer, and secretary of agriculture.	Do.

Kansas	Secretary of the State board of health.	State board of health	State board of health—10 members, all physicians except 1 who is preferably an attorney.	Governor, approved by the senate.
Kentucky	Commissioner of health	do	Kentucky State board of health—9 members, 8 of whom must be physicians and 1 a pharmacist.	8 members by the Governor—1 elected by the board. He is secretary and commissioner of health.
Louisiana	President of the Louisiana State board of health.	Governor, with consent of the senate.	Louisiana State board of health—8 members and a president, 5 of whom must be physicians, 1 a dentist, 1 an educator connected with the State public school system, and 1 a druggist—each member to be chosen from a different congressional district.	Governor, with advice and consent of the senate.
Maine	Director of health	Commissioner of health and welfare, approved by the Governor's council.	Advisory council of health and welfare—7 members.	Governor, approved by the Governor's council.
Maryland	Director of health	Governor	State board of health—9 members: 4 physicians, 1 civil engineer, 1 pharmacist, 1 dentist, and 2 ex-officio members—the attorney general of the State and the commissioner of health of Baltimore City.	Governor, with advice and consent of the senate.
Massachusetts	Commissioner of public health	Governor, with advice and consent of the public health council.	Public health council—6 appointive members, 3 of whom must be physicians, and the commissioner of public health, who is an ex-officio member of the council.	Governor, with advice and consent of the public health council.
Michigan	Commissioner of health	Governor, confirmed by the senate.	State council of health—5 members, 4 of whom must be physicians and 1 a dentist.	Governor.
Minnesota	Secretary and executive officer of the State board of health.	State board of health	Minnesota State board of health—9 members	Do.
Mississippi	Executive officer of the Mississippi State board of health.	do	Mississippi State board of health—10 members, 9 appointive and 1 elected by the board to serve as executive officer; 8 of the appointive members must be physicians and 1 a dentist.	Governor, with approval of the senate from nominations supplied by State medical and dental associations, respectively. 3 physicians are nominated from each congressional district and 3 dentists from the State at large.
Missouri	Commissioner of health	Governor	State board of health of Missouri—7 members, 5 of whom must be physicians.	Governor.
Montana	Secretary of the State board of health and executive officer.	State board of health	State board of health of Montana—5 members, all physicians.	Governor, from a list submitted by the State medical association.
Nebraska	Director of the department of health.	Governor	None	
Nevada	Secretary of the State board of health and State health officer.	State board of health, with approval of Governor.	State board of health—5 members, 2 of whom shall be physicians, 1 a dentist, and 1 the Governor.	Governor.
New Hampshire	Secretary of the State board of health.	State board of health	State board of health—7 members: the Governor, the attorney general, 3 physicians, a civil engineer, and one person who is neither physician nor engineer.	Do.
New Jersey	Director of health	do	State board of health—12 members, not more than 6 to belong to the same political party, 2 women, at least 3 physicians, 2 sanitary engineers, 1 veterinarian, 1 dentist, and 1 pharmacist.	Governor, by and with advice of the senate.

TABLE 1.—*Official designation of the chief executive officer of the State health department and the policy-forming and/or advisory body, and method of appointment of each*—Continued

State	Chief executive officer of State health department		Policy-forming and/or advisory body	
	Official designation	Appointed or elected by	Official designation and required membership	Appointed or elected by
New Mexico	Director of State department of public health.	State board of public health	State board of public health	Governor, by and with consent of the senate.
New York	Commissioner of health	Governor	Public health council—8 members, 2 of whom must be physicians, and 1 a sanitary engineer.	Governor.
North Carolina	Secretary—treasurer of the State board of health and State health officer.	State board of health, approved by the Governor.	North Carolina State board of health—9 members, including 2 physicians, 1 pharmacist, 1 engineer, and 1 dentist.	5 members by Governor and 4 members by the State medical society.
North Dakota	State health officer	Public health advisory council	Public health advisory council—5 members, 3 appointive: 1 physician, 1 dentist, and 1 woman, and 2 ex-officio: Attorney general and superintendent of public instruction.	Governor.
Ohio	State director of health	Governor, by and with consent of the senate, from a list of not less than 6 physicians certified to him by the public health council.	Public health council—6 members, 3 of whom shall be physicians, no 2 from any one congressional district.	Do.
Oklahoma	Commissioner of health	Governor	None	
Oregon	State health officer and executive officer of the State board of health.	State board of health	Oregon State board of health—9 members, 7 of whom must be physicians, 1 a dentist, and 1 a pharmacist.	Governor, with consent of the senate.
Pennsylvania	Secretary of health	Governor	Advisory health board—7 members, including the secretary of health, 4 physicians, 1 civil engineer, and 1 dentist.	Governor, with advice and consent of the senate.
Rhode Island	State director of health	Governor, confirmed by the senate.	Advisory council to the director of health—5 members.	Governor.
South Carolina	State health officer	Governor, upon recommendation of the executive committee of the State board of health.	State board of health—"The South Carolina Medical Association together with the comptroller general shall be known as the State board of health." Note: The executive committee of the State board of health (7 members) performs functions delegated to State boards of health as generally recognized.	Ex-officio membership.
South Dakota	Superintendent of the board of health.	Governor designates 1 member of the board to be superintendent.	State board of health—5 members, 4 of whom must be physicians, and 1 an osteopath.	Governor.
Tennessee	Commissioner of public health	Governor	Tennessee public health council—9 members, 6 of whom must be physicians (2 from each of the 3 grand divisions of the State), 1 a dentist, 1 a pharmacist, and 1 a representative of women's organizations.	Governor, from lists submitted by the Tennessee State Medical Association, Pharmaceutical Association, Congress of Parents and Teachers, and federated women's clubs, respectively

Texas	State health officer	State board of health	Texas State board of health—9 members, 6 of whom must be physicians, 1 a dentist, 1 a pharmacist, and 1 an engineer.	Governor.
Utah	State health commissioner	Governor to the board, and elected by board as secretary, i. e., State health commissioner.	State board of health—7 members, majority of whom shall be physicians and 1 a civil engineer.	Do.
Vermont	Executive officer and secretary of State board of health.	State board of health, with approval of the Governor.	State board of health—3 members	Governor, with advice and consent of the senate.
Virginia	Commissioner of health	Governor	State board of health—7 members, at least 2 of whom must be members of State medical society and 1 a member of the State dental association.	Governor.
Washington	Director, department of health	Governor, with consent of the senate.	State board of health—5 members, 1 of whom must be an experienced physician and the others experienced in matters of sanitation.	Do.
West Virginia	Commissioner of health	Governor, with advice and consent of the senate.	Public health council—8 members, including the commissioner of health. 7 members must be physicians and 1 a dentist.	Do
Wisconsin	State health officer	State board of health	State board of health—7 members	Governor, with consent of the senate.
Wyoming	State health officer	Governor, confirmed by the senate	State board of health—5 members, 4 of whom are physicians and 1 a dentist.	Governor.
Alaska	Commissioner of public health	Governor, confirmed by the senate.	None	
Hawaii	Territorial commissioner of public health.	Board of health	Board of health—7 members: the attorney general, 2 physicians, and other lay members.	Governor: (6 members appointive, the attorney general, ex-officio).
Puerto Rico	Commissioner of health	Governor, with consent of the senate.	Insular board of health—9 members, 4 of whom must be physicians, 1 a dentist, 1 a veterinarian, 1 a lawyer, 1 a civil engineer, and 1 an expert chemist.	Governor, with consent of the senate.
Virgin Islands	Commissioner of health	Secretary of the Interior of the United States.	None	

By summarizing the data presented in table 1, one finds that the State health officers of 28 jurisdictions are appointed by the Governor, while those of 21 States are appointed by the State board of health. In 12 States, however, gubernatorial appointees must be confirmed by the senate and in 2, by the board of health. Conversely, in 4 States where appointments are made by the board of health the approval of the Governor is required, and in another the State medical association must approve the selection. Miscellaneous practices are followed in the 4 States where neither the Governor nor the board of health appoints the health officer. For instance, in the District of Columbia the board of district commissioners performs this function, while in the Virgin Islands it is done by the United States Secretary of the Interior. In Idaho and Maine—where the health department is really a division (Idaho) and bureau (Maine) of public health, subordinate to the department of public welfare (Idaho) and the department of health and welfare (Maine)—the commissioner of the principal governmental unit appoints the director of health.

Most States prescribe by statute certain general qualifications which a State health officer must have. Phraseology most commonly used to describe those qualifications is as follows, "The State health officer shall be a physician who is licensed to practice in the State, and who is skilled and experienced in sanitary science and public health." A few jurisdictions are more specific and require that the health officer shall have practiced at least 5—sometimes 10—years within the State or that he shall have had a designated amount of public health training or actual experience in health department administration. Less than half a dozen States list no requirements whatever. States are almost evenly divided as to whether or not the State health officer is a member of the State board of health. In 3 States he may be selected either from within or without the board. The term of office of a State health officer varies from 2 years in 8 States to an indefinite period in 16. Four years represents the term of office most frequently designated.

There is some variation in the amount of independence which State health officers are permitted to exercise as executive officers of State boards of health. Usually, however, the health officer is authorized to execute and enforce all laws, rules, and regulations pertaining to the public health and to act as the direct agent of the board, performing all of its duties when this body is not in session. Expressed otherwise, as executive officer of the State board of health, the State health officer carries out all obligations of the board for protection of the public health. As administrative head of the State health department he directs, plans, and supervises all activities of the department and employs such means as may be necessary for administration of the health laws and sanitary code. More specifically, he is responsible for all funds allocated to the State health department, for appointment

and removal of health department personnel, and for supervision over county boards of health and county health officers. Frequently, he prepares rules and regulations for adoption by the State board of health, or at least makes recommendations to that policy-forming group regarding new policies or changes in old ones.

Functions of the State board of health vary from those which are solely advisory to those which are completely regulatory, including the exercise of executive and police powers for enforcement of all State laws pertaining to public health. The most usual duties are identified with the promulgation of rules and regulations, particularly the drafting and revising of State sanitary codes. Occasionally, the board of health has appointive authority, though it is more apt to be empowered only to approve appointments which have been made by the State health officer. Approval of all health department budgets is another duty sometimes imposed upon the board, though generally this also is a prerogative of the State health officer. In rare instances, functions of the State board of health are nominal only, this group being dominated by the Governor, some other unit of State government, or the State medical association.

Membership of the State boards of health ranges in number from 3 to 14. In some States it is stipulated that a certain part or even all of the members shall be physicians; in others, it is required that at least 1 member shall be a dentist, a civil or sanitary engineer, a pharmacist, an attorney, a veterinarian, an osteopath, or a woman; in still others, certain State officials are ex-officio members of the board of health by virtue of the elective office which they hold. Several States make no restrictions as to the professional status of the board members.

In all but a few States, members of the State board of health are appointed by the Governor. His selections must be approved by the senate in about a dozen States. In several, the State medical association supplies a list of nominees from which appointments are made by the Governor. Members of the State board of health serve from 2 years in one State to 7 years in three, with 6 years representing the most common period of service. The terms of individual members are overlapping in nearly three-fourths of the States. Ex-officio members, of course, serve as members so long as they occupy the office which determines their ex-officio position.

In order that State health activities might be administered as efficiently as possible, it has been found expedient to organize the health department into bureaus, divisions, services, or units representing the several health specialties and to place at the head of each bureau a director or chief who is administratively responsible for activities delegated to his particular branch of the department. The identity and number of such bureaus or divisions is not uniform.

In the relatively populous States where a large staff is employed, the health department is a complex organization having as many as 20 separate units, most of which deal with a single segment of public health or a related group of problems. Health departments of smaller States, on the other hand, have but half a dozen or so units. Under this set-up it is necessary for each director-in-charge to administer several programs. Usually services having close interrelationship are combined. Since, for the country as a whole, there are innumerable combinations, it is practically impossible to describe a "typical" health organization.

It was decided, therefore, that perhaps the clearest picture of health department organization for the country as a whole could be portrayed by listing all health activities which have been covered by this entire study [2] and showing for each the States that have established within their health departments a special bureau, division, service, or unit for administration of that particular activity. This information has been recorded in table 2. The symbol B is used to indicate that the service has an exclusive bureau status. In the same table, A is used to identify the health departments which —without having a distinct unit for the purpose—still participate in given activities. When participation is restricted to advisory service or broad regulatory authority only and does not involve an active program, this situation is indicated by the use of footnotes. Finally, there are a number of State health departments which do not participate in any way in certain activities listed. These are indicated by dashes. Activities have been placed in major and minor administrative groupings according to the arrangement most frequently found in health department organization.

The 1940 Directory of State and Insular Health Authorities [3] has been used as the authority for determining activities given bureau status. In addition to the bureaus and divisions listed in this publication, State hospitals administered by the State health department also are classified as B. Unless otherwise indicated, an activity designated as A is presumed to be an activity within the primary administrative grouping under which it is listed. When an activity is associated with a bureau other than that under which it appears, or when a major listing does not have bureau status, the A is followed by the Roman numeral identifying the particular bureau or division charged with the service. It is recognized, of course, that there is a certain amount of cross-administration which cannot be portrayed by the system utilized in table 2. When responsibility for a certain

[2] See text footnote*.

[3] Directory of State and Insular Health Authorities. Pub. Health Rep., 56:10 (January 3, 1941). Reprint 2222.

activity is divided between two separate bureaus or divisions, credit is given the one carrying the major portion of the burden. However, no attempt is made at single assignment of accountability for general services, such as health education and licensure, where a number of bureaus participate in particular phases of the activity. Footnotes are used to explain situations of this sort.

TABLE 2.—*Organization of State health departments as defined by the establishment of separate bureaus, divisions, services, or units for specified health activities* *

Activity	State or Territory								
	Alabama	Arizona	Arkansas	California	Colorado	Connecticut	Delaware	District of Columbia	Florida
I. Vital statistics	B	A[XV]	B	B	B	B	B	B	B
II. Communicable disease control, general	B	A[XVII]	B	B	B	B	B	B	B
Hookworm	A	-----	-----	-----	-----	-----	-----	-----	A
Pneumonia	A[XI]	-----	-----	-----	A	A[XV]	A	A	-----
III. Tuberculosis control (field service)	A[11]	A[XVII]	B	B	B	A[11]	A[IV]	B	B
IV. Tuberculosis hospitalization	A[5]	-----		A[5]	-----	-----	B	B	-----
V. Venereal disease control	A[11]	A[XVII]	B	B	B	A[11]	A[11]	B	B
VI. Maternity-child health activities, general	B	B	B	B	B	B	B	B[1]	B
Crippled children's services	(6)	-----	-----	B	B	B	A	A	(6)
Prevention of blindness	A	(7)	A	A[V]	A	A[XV]	A[XII]	A	A[XVI]
VII. Dental services	A[VI]	-----	B	A[VI]	B	B	B	A[VI]	B
VIII. Sanitation, general	B	B	B	B[1]	B	B	B	B	B
Water supplies and sewage disposal facilities	A	A	A	A	A	A	A	A	A
Milk control	A	-----	B		(7)	A[XII]	A	A[IX]	A
Shellfish control	A	-----	-----	A	-----	A	A	-----	A
Housing control	-----	-----	-----	-----	A	-----	-----	A	-----
Plumbing control	-----	-----	-----	-----	B	(7)	(7)	-----	(7)
Smoke, fumes, and odors control	-----	-----	-----	A	A	-----	-----	-----	-----
Rodent control	A	(7)	-----	A	-----	-----	-----	-----	-----
Garbage collection and disposal	(7)	-----	-----	(7)	(7)	A	(7)	-----	A
Malaria control	A	-----	B	A	-----	-----	-----	-----	B
Pest mosquito control	(6)	-----	(6)	(6)	-----	-----	-----	-----	(6)
Sanitation of hotels, restaurants, and tourist camps	A	A	A	A	A[IX]	A	A	A[IX]	A
Sanitation of miscellaneous establishments **	A	A	A	A	A	A	A	A	A
IX. Food and drug control	A[8, VIII]	A[8, XII]	(7)	B[1]	B	A[8, XII], B[10]	A[VIII]	B	A[8, VIII], B[10]
X. Industrial health activities	A[11]	(7)	(7)	B	A[VIII]	B	(7)	(7)	(7)
XI. Medical care, general***	-----	-----	-----	B	-----	-----	-----	B	-----
Mental disorders	-----	-----	-----	-----	-----	B	-----	A	-----
Cancer	(7)	-----	A[11]	-----	(7)	B	A[XV]	-----	A[XV]
XII. Laboratory services	B	(9)	B	B	B	B	B	B	B
XIII. Health education	A[XV]	B	A[11]	A[11]	A[11]	B	A[11]	B	B
XIV. Licensure ****	-----	-----	-----	A[11]	A[VI]	B	A[VI]	A[I]	A[VI]
XV. Administration, general	B	B	B	B	B	B[12]	B	B[12]	B
Accounting	A	A	A	A	A	A	A	A	B
XVI. Public health nursing	A[VI]	B	B	B	B	B	A[VI]	B	B
XVII. Local health administration	A[XV]	B	B	B	A[11]	B	A[XV]	-----	B

See footnotes at end of table.

TABLE 2.—*Organization of State health departments as defined by the establishment of separate bureaus, divisions, services, or units for specified health activities*—Continued

Activity	Georgia	Idaho	Illinois	Indiana	Iowa	Kansas	Kentucky	Louisiana	Maine
	State or Territory								
I. Vital statistics	B	B	B [1]	B	B	B	B	B	B
II. Communicable disease control, general	B	A [XVII]	B	B	B	B	B [1]	A [XVII]	B
Hookworm	A [2]								
Pneumonia	A	A [XVII]	B	A [II]	A	A	A [8]	A [III]	A
III. Tuberculosis control (field service)	B	A [XVII]	A [II]	A [II]	B	B	B	B	A [II]
IV. Tuberculosis hospitalization	B	A [4]					B		
V. Venereal disease control	A [II]	A [XVII]	B	B	B	B	B	B	B
VI. Maternity-child health activities, general	B	B	B	B	B	B	B	B	B
Crippled children's services	(7)	A						B	A
Prevention of blindness	A	(7)	A [II]	A	A	A [XII]	B	A [XVII]	A
VII. Dental services	B		B	A [VI]	A [VI]	B	B		B
VIII. Sanitation, general	B	B	B [1]	B [1]	B	B	B	B [1]	
Water supplies and sewage disposal facilities	A	A	A	A	A	A	A	A [8]	A
Milk control	(7)	A	A	B	(7)	A [IX]	A [IX]	A [IX]	
Shellfish control								A [IX]	
Housing control				A	A [8]				
Plumbing control				A	(7)		A	A	A
Smoke, fumes, and odors control			A						A
Rodent control	A					(7)		A	
Garbage collection and disposal	(7)		(7)	A	A		(7)	A	
Malaria control	B	A	A	A	A			A	
Pest mosquito control			(6)	(6)		(7)		(6)	(7)
Sanitation of hotels, restaurants, and tourist camps	A	A	B	A			A [IX]	A [IX]	A
Sanitation of miscellaneous establishments**	A	A	A	A	A	A	A	A	A
IX. Food and drug control		A [VIII]		B [1]		B	B	B	
X. Industrial health activities	(7)	B	B	B	A [VIII]	A [VIII]	(7)	(7)	A [8]
XI. Medical care, general***									
Mental disorders							B		
Cancer	B	(7)	B	A [XIII]	A [II]	A [XV]		A [VI]	
XII. Laboratory services	B	B	B	B	B	B	B	B	B
XIII. Health education	A [I]	A [II]	B	B	B	B	B	A [II]	A [XV]
XIV. Licensure ****	A [VI]		A [VI]		B		B		B
XV. Administration, general	B	B	B	B [12]	B	B	B	B	B
Accounting	A	A	A	B	A	A	B	A	A
XVI. Public health nursing	B	B	A [VI]	B	B	A [VI]	B	A [VI]	B
XVII. Local health administration	B	B	B	B	B	B	B	B	

Activity	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana	Nebraska	Nevada
	State or Territory								
I. Vital statistics	B		B	B	B	B	B	B	B
II. Communicable disease control, general	B	B	B	B	B	A [XVII]	B	B	B
Hookworm					A				
Pneumonia	A [XV]	A	A	A	A	B	A		
III. Tuberculosis control (field service)	A [II]	B	A [II]	A [II]	A [IV]	A [XVII]	A [II]	B	A [XV]
IV. Tuberculosis hospitalization		B			B				
V. Venereal disease control	A [II]	B	A [II]	B	B	B	A [II]	A [II]	B

See footnotes at end of table.

TABLE 2.—*Organization of State health departments as defined by the establishment of separate bureaus, divisions, services, or units for specified health activities*—Continued

Activity	Maryland	Massachusetts	Michigan	Minnesota	Mississippi	Missouri	Montana	Nebraska	Nevada
	State or Territory								
VI. Maternity-child health activities, general	B	B	B	B	B	B	B	B	B
Crippled children's services	A II	A XV	-----	-----	-----	-----	-----	-----	A
Prevention of blindness	A XV	A XII	A II	A	A	B	A	(7)	A
VII. Dental services	A XV	A VI	B	B	B	B	(7)	B	B
VIII. Sanitation, general	B	B	B	B	B	B	-----	B [1]	B [1]
Water supplies and sewage disposal facilities	A	A	A	A	A	A	B	A	A
Milk control	A IX	A IX	A	A	B	(7)	-----	-----	(7)
Shellfish control	A IX	A	-----	-----	A	-----	-----	-----	-----
Housing control	-----	-----	(7)	-----	-----	-----	-----	-----	(7)
Plumbing control	(7)	(7)	-----	A XV	-----	(7)	-----	-----	(7)
Smoke, fumes, and odors control	-----	-----	-----	-----	-----	-----	-----	-----	(7)
Rodent control	-----	-----	-----	-----	-----	-----	-----	-----	(7)
Garbage collection and disposal	A	(7)	(7)	A	(7)	-----	(7)	-----	(7)
Malaria control	-----	-----	-----	A	B	A	-----	-----	-----
Pest mosquito control	-----	A	-----	(8)	(8)	-----	-----	-----	A
Sanitation of hotels, restaurants, and tourist camps	A	A IX	A	B	A	A	A IX	-----	A
Sanitation of miscellaneous establishments**	A	A	A	A	A	A XIV	A	A	A
IX. Food and drug control	B	B	-----	A 10, XV	(7)	B	B	-----	A VIII
X. Industrial health activities	A VIII	(7)	B	B	B	A VIII	B	(7)	(7)
XI. Medical care, general***	-----	-----	-----	A II	-----	-----	-----	-----	-----
Mental disorders	A VI	-----	-----	-----	-----	-----	-----	-----	-----
Cancer	-----	B	A XV	(7)	A XV	(7)	A II	-----	-----
XII. Laboratory services	B [1]	B	B	B	B	B	B	B	B
XIII. Health education	B	A VI	B	B	B	B	A VI	A II	A XV
XIV. Licensure****	A I	A III	A VIII	A XV	A XV	B	-----	B	-----
XV. Administration, general	B [12]	B	B	B	B	B	B	B	B
Accounting	B	A	A	A	A	A	A	A	A
XVI. Public health nursing	B	A VI	B	B	B	B	A VI	B	A VI
XVII. Local health administration	A XV	A XV	B	B	B	B	B	-----	A II

Activity	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon
	State or Territory								
I. Vital statistics	B	B	B	B	B	B	B	B	B
II. Communicable disease control, general	B	A XVII	A XVII	B	B	B	A VI	B	A XV
Hookworm	-----	-----	-----	-----	-----	-----	-----	A	-----
Pneumonia	A XV	A XVII	A XVII	B	-----	A	A [4]	A	-----
III. Tuberculosis control (field service)	A XV	(8)	A XVII	B	(8)	A II	A VI	B	A XV
IV. Tuberculosis hospitalization	-----	-----	-----	B	-----	-----	-----	-----	-----
V. Venereal disease control	B	B	B	B	A II	A II	A [4]	B	B
VI. Maternity-child health activities, general	B	B	B	B	B [1]	B	B	B	B
Crippled children's services	B	-----	-----	B	A II	-----	-----	-----	-----
Prevention of blindness	A	A	A XVII	(7)	A II	A II	A VI	A II	A
VII. Dental services	-----	B	A VI	A VI	B	(7)	B	B	B

See footnotes at end of table.

Table 2.—*Organization of State health departments as defined by the establishment of separate bureaus, divisions, services, or units for specified health activities*—Continued

Activity	State or Territory								
	New Hampshire	New Jersey	New Mexico	New York	North Carolina	North Dakota	Ohio	Oklahoma	Oregon
VIII. Sanitation, general	B	B	B	B	B	B	B	B	B
Water supplies and sewage disposal facilities	A	A	A	A	A	A	A	A	A
Milk control	A	B	A	A	A	A	(7)	B	A
Shellfish control	A	B	----	----	A	----	----	----	A
Housing control	----	----	----	----	----	----	----	----	----
Plumbing control	A	----	----	(7)	----	(7)	A	(7)	B
Smoke, fumes, and odors control	A	----	----	----	----	A	----	----	----
Rodent control	----	----	----	----	A II	----	----	----	----
Garbage collection and disposal	(7)	----	(7)	(7)	----	(7)	A [3]	(7)	(7)
Malaria control	----	A XVII	A	----	A II			B	----
Pest mosquito control	----	----	----	----	----	(7)	(6)	*	(6)
Sanitation of hotels, restaurants, and tourist camps	A	A IX	----	A	A	----	----	A IX	B
Sanitation of miscellaneous establishments **	A	(7)	A	A	A	A	A	A	B
IX. Food and drug control	A VIII	B	(7)	B [10]	A VIII	----	(6, 8)	B	----
X. Industrial health activities	A VIII	(7)	(7)	(7)	B	(7)	A [4]	B	(7)
XI. Medical care, general ***	----	A V	----	A 5, XV	----		----	----	----
Mental disorders	----	A VI	----	----	----	----	----	----	----
Cancer	A XV	(7)	(7)	B [1]	----	A XV	(7)	----	B
XII. Laboratory services	B	B [1]	B	B	B	B	B	B	B
XIII. Health education	A XV	A XV	A II	B	A VI	A XV	A II	B	B
XIV. Licensure ****	----	A II	A VI	B	----	A XV	A VI	----	B
XV. Administration, general	B	B	B	B	B	B	B [12]	B	B
Accounting	A	A	A	B	A	A	A [1]	B	A
XVI. Public health nursing	B	B	B	B	A XVII	A VI	B	B	B
XVII. Local health administration	A II	B	B	B	B	B	A XV	B	B

Activity	State or Territory								
	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia
I. Vital statistics	B	B	B	B	B	B	B	A XV	B
II. Communicable disease control, general	A XVII	B	B	B	B	A XVII	B	B	B
Hookworm	----	----	----	----	----	----	----	----	----
Pneumonia	A XVII	A	A XII	----	A	A XII	A	A	A
III. Tuberculosis control (field service)	B	A II	A IV	A II	B	B	A II	B	B
IV. Tuberculosis hospitalization	B	B	B	----	A [5]	----	B	----	B
V. Venereal disease control	A XVII	A II	B	A II	A II	B	B	A II	B
VI. Maternity-child health activities, general	B	B	B	B	A XVII	B	B	B	B
Crippled children's services	B	B	B	A	A XV	----	B	B	B
Prevention of blindness	A	A	(7)	A II	A XV	A	----	A II	A [1]
VII. Dental services	A VI	A VI	B	A VI	A XVII	B	B	A VI	B

See footnotes at end of table.

Table 2.—*Organization of State health departments as defined by the establishment of separate bureaus, divisions, services, or units for specified health activities*—Continued

Activity	Pennsylvania	Rhode Island	South Carolina	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia
	State or Territory								
VIII Sanitation, general	B	B	A [XV]	B	B	B [1]	B	B	B
Water supplies and sewage disposal facilities	A	A	A [XV]	A	A	A	A	A	A
Milk control	B	A	A [XV]	A	A	A [IX]	---	---	A [XVII]
Shellfish control	---	A	A [XV]	---	---	A	---	---	A
Housing control	B	---		---	---	---	---	---	(7)
Plumbing control	---	---	---		---	(7)	---	A	---
Smoke, fumes, and odors control	A	---		---	---	---	---	---	(7)
Rodent control	---	---	A [XV]	---	---	A	---	---	---
Garbage collection and disposal	(7)	(7)		A	---	A	---	---	(7)
Malaria control	---	---	A [XV]	---	A [II]	B	---	---	A
Pest mosquito control	---	---	(6)	---	---	(6)	---	---	(6)
Sanitation of hotels, restaurants, and tourist camps	A	A	A [XV]	A	---	A	---	A	A
Sanitation of miscellaneous establishments **	A	A	A [XV]	A	A	A	A	A	---
IX Food and drug control	A [10, XVII]	A [6, VIII] B [10]	A [3, XV]	---	---	B	---	A [VIII]	---
X. Industrial health activities	A [XVII]	A [II]	B	(7)	A [3, II]	B	B	A [III]	B
XI. Medical care, general ***	---	---		---		---	---	---	---
Mental disorders	---	A [XV]	(7)	---	A [XV]	A [V]	---	---	---
Cancer	A [XVII]	A [II]	B		(7)	A [XII]	---	(7)	---
XII. Laboratory services	A [XVII]	B	B	B	B	B	B	B	B
XIII. Health education	A [XVII]	A [XV]	A [II]	A [II]	A [XV]	B	B	A [II]	B
XIV. Licensure ****	B	B	---	B	---	A [II]	A [VI]	---	---
XV. Administration, general	B [12]	B	B	B	B	B	B [12]	B	B
Accounting	B	A	A	B	A	A	B	A	A
XVI. Public health nursing	B	A [VI]	A [VI]	B	A [XVII]	A [VI]	B	B	B
XVII Local health administration	B	---	B	A [XV]	B	B	B	---	B

Activity	Washington	West Virginia	Wisconsin	Wyoming	Alaska	Hawaii	Puerto Rico	Virgin Islands
	State or Territory							
I. Vital statistics	B	B	B	B	---	B	A [II]	There is no departmentalization in the health department
II. Communicable disease control, general	B	B	B	B	B	B	B	
Hookworm	---	---	---	---	---	---	A [XVII]	
Pneumonia	---	A [3, XII]	A [XII]	---	A [II]	A	---	
III. Tuberculosis control (field service)	A [II]	B	A [II]	A [II]	B	B	B	
IV. Tuberculosis hospitalization	---	---	B			A [5]	B	
V. Venereal disease control	A [II]	B	B	A [XII]	A [II]	B	B	
VI Maternity-child health activities, general	B	B	B	B	B	B	B	
Crippled children's services	---	---	---	A	A	B	A	
Prevention of blindness	(7)	A	A [1]	(7)	A	A	A	
VII Dental services	A [VI]	B	B	A [VI]	A [VI]	---	A [VI]	

See footnotes at end of table.

TABLE 2.—*Organization of State health departments as defined by the establishment of separate bureaus, divisions, services, or units for specified health activities*—Continued

Activity	State or Territory							
	Washington	West Virginia	Wisconsin	Wyoming	Alaska	Hawaii	Puerto Rico	Virgin Islands
VIII. Sanitation, general	B	B	B [1]	B	B	B	B [1]	There is no departmentalization in the health department
Water supplies and sewage disposal facilities	A	A	A	A	A	A	A	
Milk control	A	A	----	----	A	A	B	
Shellfish control	A		----	----	A	----	----	
Housing control	----	----		----	----	A	A	
Plumbing control	----	----	A XIV	----	([7])	A	B	
Smoke, fumes, and odors control	A	----	A	----	----	A	([7])	
Rodent control	----	----		----	----	A	([7])	
Garbage collection and disposal	([7])	----	A	([7])	([7])	([7])	A	
Malaria control	----	----	A	----	----	A [11]	A [11]	
Pest mosquito control	----	----	([6])	----	----	([6])	([6])	
Sanitation of hotels, restaurants, and tourist camps	----	A	A XIV	----	A	A	A.	
Sanitation of miscellaneous establishments **	A	A XIV	A XIV	A	A	A	A	
IX. Food and drug control	----	----	----	----	A VIII	B	B	
X. Industrial health activities	([7])	B	B	([7])	----	A VIII	A VIII	
XI. Medical care, general ***	----	----	----	----	----	A [11]	B	
Mental disorders	([7])	([7])	----	----	----	B	B	
Cancer	([7])	----	A XV	----	----	----	([6])	
XII. Laboratory services	B	B	B	B	B	A [11]	B [1]	
XIII. Health education	B	B	A [11]	A VI	A XV	A XV	A XV	
XIV. Licensure ****	----	B	B	----	----	A [11]	A [11]	
XV. Administration, general	B	B	B	B	B	B	B [12]	
Accounting	A	A	A	A	A	A	B	
XVI. Public health nursing	B	B	B	A VI	B	B	A XVII	
XVII. Local health administration	A XV	B	A XV	----	----	----	B	

*Code

A—Activity, but no special bureau, division, service, or unit. Unless otherwise indicated, an activity designated as A is presumed to be an activity within the primary administrative grouping under which it is listed. When an activity is associated with a bureau other than that under which it appears, or when any major listing does not have bureau status, the A is followed by the Roman numeral identifying the particular bureau or division charged with the service.

B—Bureau, division, service, or unit as reported to the United States Public Health Service for the 1940 Directory of State and Insular Health Authorities [Pub. Health Rep., 56.10 (January 3, 1941) Reprint 2222], plus hospitals administered by the State health department. In a few instances, where supplemental data pointed to an omission in the directory reports, a B status has been accorded the activity in question

** Swimming pools, barber shops, and/or beauty parlors.

*** Medical services for migratory laborers and for clients of vocational rehabilitation programs, as well as for the unspecified needy are included.

**** Includes any one or any combination of the following professions and facilities rendering health services: Members of the healing arts (physicians, osteopaths, chiropractors, optometrists, nurses, dentists, dental hygienists, and pharmacists), midwives, embalmers and funeral directors, barbers and beauticians, operators of water and sewage treatment plants, hospitals, and/or other health facilities or personnel

[1] Two separate bureaus are established for carrying on this activity.

[2] Activity of the bureau of malaria which is not included in the major administrative groupings of this table.

[3] Activity not of a routine nature· Engaged in to a limited extent—in the absence of local service, upon request or complaint, or voluntarily, because the agency having authority is inactive.

[4] Activity of the bureau of adult hygiene which is not included in the major administrative groupings of this table.

[5] Does not operate a State hospital, but subsidizes local hospitals.

[6] Indirectly only· Official activity limited to general nursing service, laboratory service, general medical care, or antimalaria measures.

[7] No active program; however, broad powers of the State health department include regulatory authority; advisory service is given upon request; or some educational measures are engaged in.

[8] Food control only.

[9] The State public health laboratory is not actually a part of the State health department, but is financially aided by the State board of health.

[10] Drug control only.

[11] No single bureau is charged with this activity. Various bureaus participate in its several phases.

[12] In addition to the general administrative office, there is a separate unit charged with one of the following: Selection and training of personnel, procurement and distribution of supplies, social service, or law enforcement.

While most health department bureaus and divisions have been established for administration of activities designed to correct one or more specific health problems or to supply central services affecting all branches of public health work, most State health organizations also include one or more divisions for such purposes as business management or supervision of personnel engaged in generalized health services. In order that the picture of health department organization might be complete, these units have been listed in the stub of table 2 as addenda to the specialized health activities. The purpose of this procedure is to show the frequency with which they operate, either as separate entities or as subsidiary services within other units. Contributions of these three administrative and supervisory units (general administration, public health nursing, and local health administration) have been referred to in earlier chapters as they applied to special service categories. However, there has been no discussion of the over-all functions of these units as distinguishable sections of the State health agency. Therefore, a brief résumé of such functions is appropriate at this point.

General administration occupies the nuclear position in health department organization. For the most part, an administrative unit is composed of a health officer and his immediate staff, engaged primarily in directing legislative relations, coordinating the work of service units, maintaining contacts with the State board of health, and carrying out necessary fiscal procedures. Frequently, the operation of such projects as merit systems, legal administration, personnel and accounts, and stenography are combined in the functions of the executive office, while occasionally purchase of all equipment and supplies and handling of all travel and communications for the entire health department are duties allocated to the division of administration rather than to each specialized division involved in performance of service.

Public health nursing when listed separately as a State-level activity is essentially an administrative and supervisory service. Most of the States that have no independent nursing units assign nurses to their respective State bureaus or to local health projects, often providing in the bureau of maternal and child health some means of coordinating nursing activity.

Arrangements for the supervision of local health services are by no means shaped to one pattern. In several States there are no organized local health services outside of the larger municipalities; thus no particular medium of general supervision by the State is exercised. A few health departments which participate financially in the support of local health agencies have not established integral means of supervision. Others have vested all supervisory power in the unit for

central administration, the deputy State health officer often acting as director of local health administration, while in others, local supervision has been made subordinate to the bureau of epidemiology. Approximately three-fifths of the States, however, maintain divisions specifically designed for liaison work—principally supervision and consultation—with local health units.

Careful study of the information recorded in table 2 reveals that in 1940 certain health activities were almost always given bureau status in health department organization, while other programs without exception represented adjuncts to previously established units. For instance, during that year, the health departments of more than 40 States operated bureaus or divisions for general administration, collection and preservation of vital statistics, general communicable disease control, improvement of maternity and child health, general sanitation, and provision of diagnostic laboratory services. Moreover, between 30 and 40 States reported separate health department units set up especially for venereal disease control, generalized public health nursing, and local health administration.

At the other end of the scale, it is observed that not a single health department included a bureau, division, service, or unit identified exclusively with smoke, fumes, or odors control, garbage collection and disposal, pest mosquito control, rodent control, or hookworm control; and in only one State each were separate units maintained for housing control, and shellfish sanitation. Plumbing control, supervision of hotels and restaurants, psychiatric services, prevention and care of blindness, pneumonia control, and general medical care of the needy are other types of health activities which are administered as separate and independent projects by not more than five States. It is true, of course, that the absence of specialized units for particular health services does not imply necessarily that nothing is being done in these fields. As shown in table 2, health department personnel participate in many activities which are not organized as separate bureaus or divisions.

Falling between the upper and lower limits cited, from the standpoint of frequency with which distinct units are established by State health departments, are the remaining health activities under consideration. More than 5 but less than 10 States maintained divisions organized specifically for cancer services, for malaria control, and for milk sanitation. Tuberculosis hospitals and divisions of licensure, of industrial hygiene, of food and drug control, of accounts, and of crippled children's services were reported by State health departments numbering from 10 to 20, while from 20 to 30 departments have formed separate units for tuberculosis field services, for dental services, and for health education.

Some consideration should be given perhaps to the placement of health activities which are not set up as separate units in health department organization. Of the group which are administered as subordinate functions of other sections in more than half of the States, milk sanitation and sanitation of hotels and restaurants and of swimming pools are usually carried by the bureau or division of sanitary engineering which often was established primarily for supervision of water supplies and sewage disposal facilities. There are some States, however, in which hotel and restaurant sanitation is one phase of a broad program of food and drug control; there are others in which milk control is delegated to the bureau of foods and drugs. Pneumonia control and tuberculosis field services when not operated as distinct enterprises are apt to be included in the programs of general communicable disease control. Activities for the prevention of infant blindness, which are usually associated with distribution of silver nitrate, are divided between numerous health department bureaus, outstanding among which are divisions of maternity and child hygiene, general communicable disease control, laboratories, and the central office of administration. Health education activities, likewise, are scattered among various bureaus when no single unit is established for this purpose.

Between one-fourth and one-half of the States operate the following health activities as auxiliary services, and usually they are placed in the main units indicated: Shellfish sanitation, malaria control, and food and drug control in the division of sanitary engineering; dental care and public health nursing in the division of maternity and child health; venereal disease control in the division of preventable diseases or epidemiology; and cancer services in either the office of central administration or the division of preventable diseases. Licensure of personnel and facilities rendering health services—unless performed by a bureau or division established especially for that purpose—is apt to be split among the units to which the various professional groups or facilities are most closely related. For instance, sanitation personnel (operators of water and sewage treatment plants) are certified by the division of sanitary engineering; midwives and maternity hospitals are licensed by the bureau of maternity and child health; tuberculosis hospitals, by the bureau of tuberculosis; and, occasionally, members of the healing arts and embalmers, by the office of general administration. When licensing of plumbers, barbers, and beauticians falls within health department jurisdiction it is usually handled by a separate division.

As demonstrated by table 2, there is no unanimity of health department organization; a variety of schemes prevail for the setting up of health department bureaus and divisions. Several of these are

illustrated by the copies of organization charts shown here. These particular charts have been chosen because they portray a wide range in organizational development and in arrangements for providing direct services. Figure A represents a department that is extremely simple in structure, as well as one which is conspicuously centralized. Only a few counties in this State have full-time health organization; therefore, the State department is called upon to furnish the bulk of

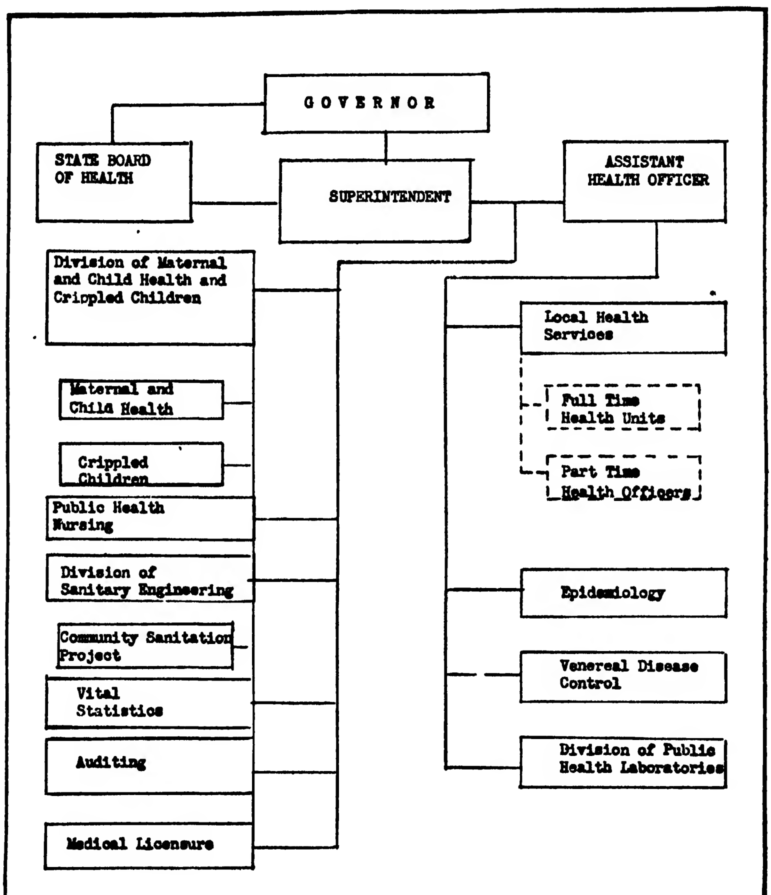


FIGURE A.—Health department organization

services available. Figure B illustrates marked decentralization of the services afforded. Since there is provision for local service in over half of the counties of this jurisdiction, it is the State policy to expand further such local organizations and to operate through them rather than directly from the State level. Figure C depicts a most elaborate scheme of organization. Moreover, it represents a combination of the service plans portrayed by figures A and B, that

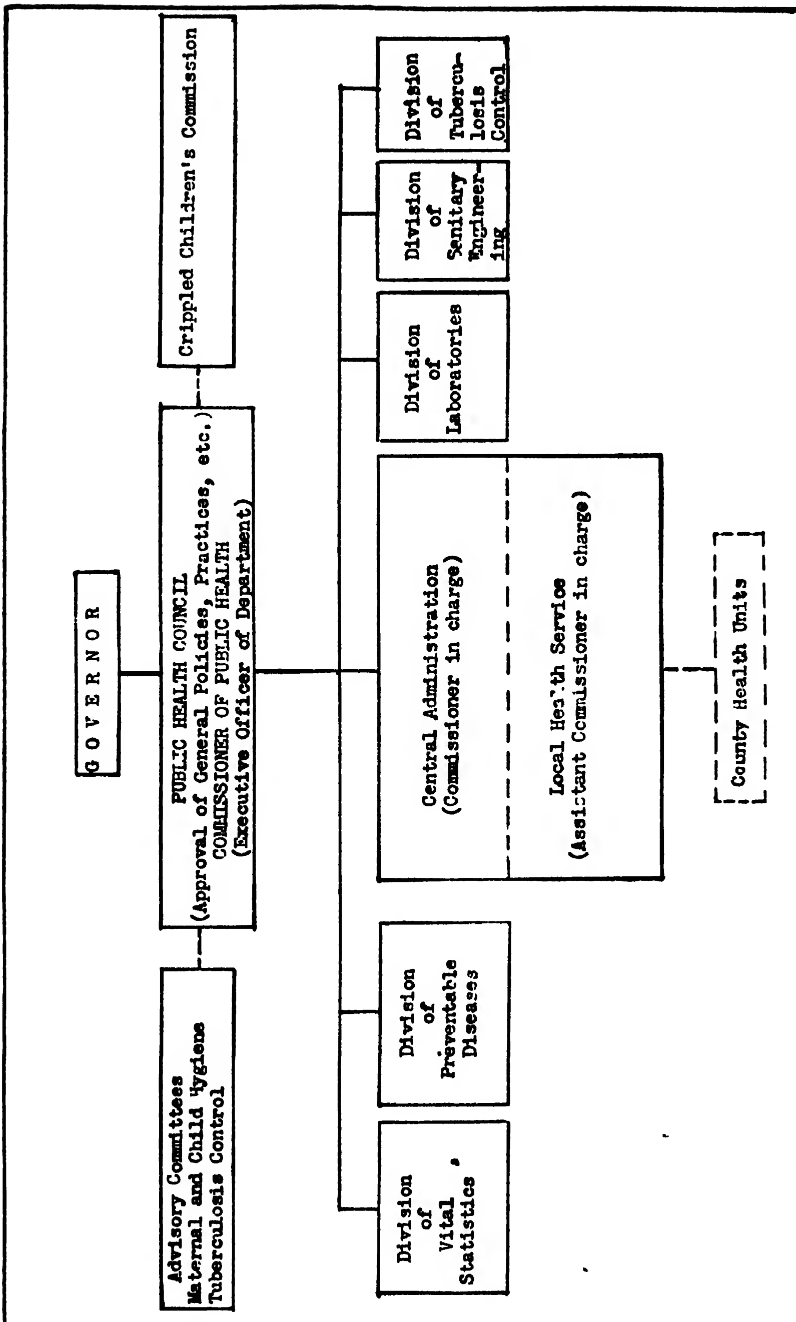


FIGURE B.—Health department organization

is, provision of direct service by both the State and local units of government.

In an effort to compensate for inadequacies of local services, to insure better distribution of service available from the State level, and/or to facilitate supervision over local health activities, 16 State

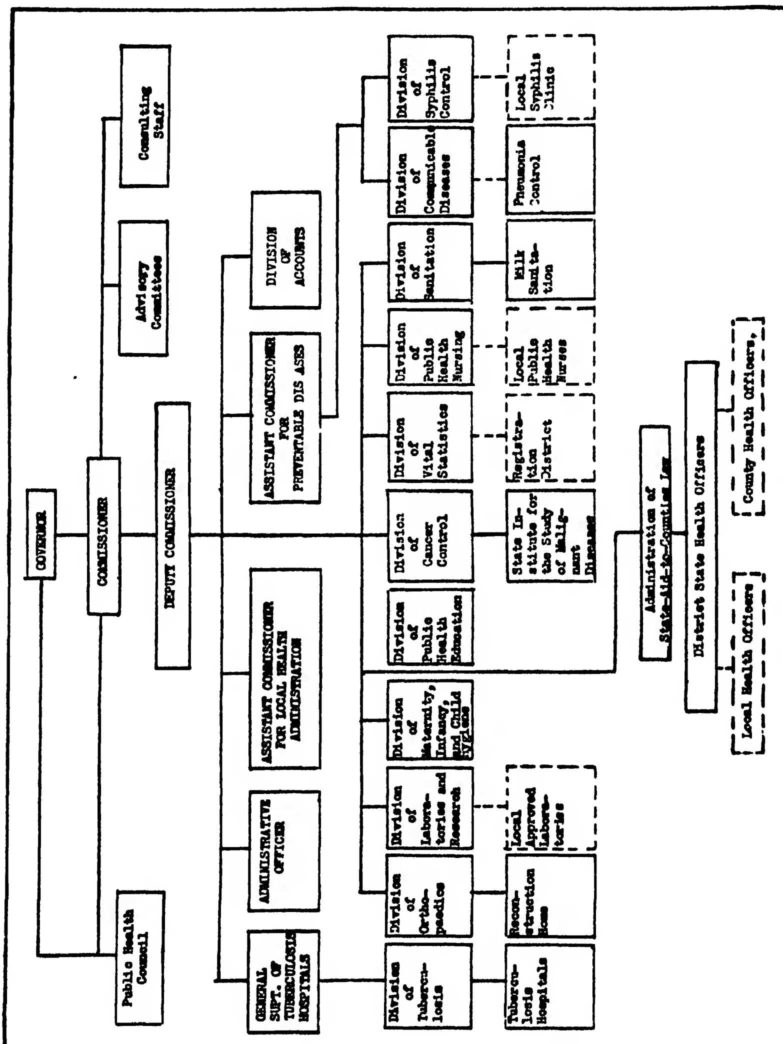


FIGURE C.—Health department organization

health departments in 1940 had established one or more State health districts, with headquarters located at a strategic point in the area served. The number of such districts formed ranged from 1 in North Dakota to 19 in Illinois and in New York. In 10 of the 16 States which had established health districts, the entire State was covered

by the formation; in the remaining 6, only selected areas within the State were organized in this manner. A medical director, nurse, sanitary engineer, and clerk usually constitute the minimum staff of a State health district. Duties of these personnel are sometimes wholly supervisory and advisory to the local health units operating within the State district. In other instances, where no organized local units exist, personnel of the State district are charged with the rendering of direct service such as is provided ordinarily by counties or other political subdivisions. Under a third set-up, their commitments embrace both supervisory and advisory activities and the rendering of direct service.

Still a third important distinction in health department organization is the administration of tuberculosis or other special hospitals. As shown by the organization charts of the States included here, operation of such hospitals may or may not be a health department function.

ADMINISTRATIVE AND FIELD PERSONNEL EMPLOYED BY STATE HEALTH DEPARTMENTS

Further evidence of the variation which exists in health department organization is found in the size of staff maintained by the several State health agencies According to table 3, the number of State health department employees ranges from 28 in Alaska to 1,282 in New York. As a matter of fact, the health department staffs of 7 States comprise less than 50 members each, whereas those of 2 exceed 1,000. All figures are exclusive of institutional personnel because consideration of the internal administration of hospitals operated by State health departments is beyond the scope of this study. Again it should be emphasized that these differences are not necessarily indicative of corresponding differences in either the quality or quantity of health service available to the residents of a given community. Locally employed health department personnel may or may not complement the services rendered by the State staff. It is entirely possible that there may be strong organizations at both the State and local levels. On the other hand, a strong State staff may have been developed to compensate for local inadequacies. Again, because of concentration upon development of local health departments, minimal activity may characterize the State agency. Finally, some States may be deficient in both respects.

Not only do State health departments differ with respect to the size of their complete staffs, but they also show some dissimilarity in their composition. In some States the number of public health nurses exceeds the number of sanitation personnel employed; in others, the reverse is true. Likewise, the number of physicians is sometimes larger and sometimes smaller than either of the aforementioned professional categories.

TABLE 3.—*Full-time personnel, exclusive of those in institutions, of different professional classifications employed by State health departments*

State or Territory	Number of persons of each classification employed full time by State health departments											
	All classifications	Physicians	Nurses	Dentists	Sanitation personnel		Technicians*	Health educators	Administrators not covered by other classifications	Clerical and records personnel	Laborers	Other and unclassified personnel
					Engineers	Others						
Total	11,269	889	1,903	133	611	1,019	1,226	148	85	3,740	537	978
Alabama	232	24	38	2	17	7	43	1	2	61	20	17
Arizona	31	3	3	—	2	1	4	1	1	16	—	—
Arkansas	67	6	7	3	6	1	11	—	—	31	2	—
California	374	46	50	4	2	70	35	3	1	1[illegible]4	1	8
Colorado	110	7	36	1	1	9	8	—	2	38	3	5
Connecticut	174	14	17	1	10	4	37	2	4	74	3	8
Delaware	64	6	18	—	2	4	11	—	1	17	4	1
District of Columbia	302	13	94	—	2	52	31	1	—	74	5	30
Florida	195	20	16	2	8	29	29	2	—	73	15	1
Georgia	195	22	15	—	28	—	32	4	—	77	17	—
Idaho	36	2	3	—	4	3	9	—	1	12	1	1
Illinois	480	42	89	6	36	25	52	9	1	176	31	13
Indiana	223	15	42	2	20	41	20	2	1	56	8	16
Iowa	168	16	44	1	18	6	15	1	5	51	3	8
Kansas	95	7	6	1	13	8	20	1	1	35	2	1
Kentucky	187	15	6	8	6	19	18	3	4	95	11	2
Louisiana	470	13	15	—	7	150	7	—	—	41	2	235
Maine	127	12	35	1	8	5	14	1	—	45	—	6
Maryland	135	5	2	1	10	9	18	1	—	63	13	13
Massachusetts	420	40	34	2	27	17	88	12	—	148	25	27
Michigan	377	20	9	2	20	1	59	3	11	93	—	159
Minnesota	272	16	41	2	20	22	32	2	2	120	12	3
Mississippi	123	10	9	—	5	3	17	1	—	63	3	12
Missouri	230	24	64	3	14	39	8	2	2	63	10	1
Montana	43	4	4	—	3	4	8	2	1	16	1	—
Nebraska	55	8	15	1	1	2	4	—	3	19	—	2
Nevada	35	3	14	1	1	3	4	—	1	8	—	—
New Hampshire	70	4	21	—	6	4	11	—	—	22	—	2
New Jersey	315	15	84	1	13	24	40	5	8	97	14	14
New Mexico	51	4	6	—	2	3	9	2	1	21	—	3
New York	1,282	88	207	2	72	21	121	4	1	437	100	229
North Carolina	185	10	10	30	15	8	33	1	1	68	7	4
North Dakota	53	6	11	—	7	1	6	1	1	18	2	—
Ohio	153	4	6	2	16	5	19	2	—	84	11	4
Oklahoma	132	17	35	1	6	9	16	—	1	36	—	11
Oregon	60	4	6	1	4	3	5	1	—	32	—	4
Pennsylvania	1,013	44	226	2	54	164	41	20	5	416	15	26
Rhode Island	118	8	21	—	5	20	20	—	5	29	6	4
South Carolina	126	19	20	6	9	—	17	2	1	51	1	—
South Dakota	41	4	6	—	5	2	2	—	—	19	2	1
Tennessee	284	52	45	3	11	2	42	29	—	81	13	6
Texas	351	25	48	6	31	31	75	15	5	84	9	22
Utah	130	12	58	2	3	7	7	1	1	32	1	6
Vermont	74	8	32	1	2	3	5	1	—	20	1	1
Virginia	392	60	107	22	9	63	27	1	—	99	3	1
Washington	64	6	6	—	4	4	10	1	2	28	2	1
West Virginia	81	7	8	—	12	5	10	1	1	33	4	—
Wisconsin	201	26	32	1	17	17	15	5	6	74	3	5
Wyoming	34	3	14	—	1	—	4	1	1	9	1	—
Alaska	28	3	14	—	1	2	2	—	—	5	1	—
Hawaii	261	7	66	—	5	47	17	1	—	56	53	9
Puerto Rico	498	31	79	7	12	35	34	—	1	167	79	53
Virgin Islands	52	9	9	2	—	5	4	—	—	3	17	3

* Includes all technical laboratory personnel, irrespective of their acquired skills; also X-ray technicians, physiotherapists, and dental hygienists.

For the entire country, clerical and records personnel head the list from the standpoint of numerical preponderance. One-third of the total number of health department employees (11,269) fall within the clerical and records classification. Not only do clerical and records

personnel occupy the leading position for the country as a whole, but they maintain that position in over three-fourths of the States. While one or more persons of this classification are attached to practically every health department bureau or division, by far the largest number are assigned to the vital statistics section. For individual jurisdictions the health department clerical staff ranges from 3 persons in the Virgin Islands to 437 in New York.

In the aggregate, nurses constitute the second largest group of health department employees, over 1,900 of them being reported by the 53 health agencies under discussion. Extreme variation, which is determined by the State's general service policy, characterizes the number of nurses employed by separate departments. Sixteen State health organizations reported less than 10 nurses each, while 3 reported more than 100. Eighteen nurses were employed by the health department occupying the median position. As indicated earlier in this report, nurses of independent nursing units are engaged primarily in administrative and supervisory service. However, those assigned to other health department bureaus, such as venereal disease divisions, tuberculosis or industrial hygiene units, or divisions of maternity and child hygiene, usually render a certain amount of specialized direct service. Those attached to the offices of State health districts also perform actual field services, but usually under this set-up the nursing done is of a generalized nature.

Sanitation personnel, including engineers, milk specialists, and general sanitary inspectors, follow nurses in point of numbers. The field of activity of sanitation personnel is broad and varied. Outstanding among their responsibilities are supervision of water supplies and sewage disposal facilities, food and drug control—including milk and shellfish sanitation, hotel and restaurant inspection, and miscellaneous sanitation activities, as well as malaria and plague control. Sanitation personnel are customarily assigned to divisions or subdivisions of sanitary engineering, to bureaus of food and drugs, or—when such services are organized separately—to hotel and restaurant supervision or malaria or rodent control. Considerably less than half of the health department employees participating in sanitation activities are engineers. Although, in the aggregate, engineers are exceeded by less highly trained sanitation personnel, this situation is reversed in 25 States. In fact, 3 State health departments employ engineers only for their sanitation work.

The term "technicians" covers a widely diversified group composed of X-ray technicians, physical therapists, dental hygienists, and all technical laboratory personnel, irrespective of their acquired skills. Glass washers, nontechnical aides, and the like are classified as laborers, however. Among the health department employees listed as tech-

nicians, those identified with laboratory work outnumber all others combined.

Among the employees listed as "other and unclassified," nutritionists constitute the largest group for which identity was established. Social workers also make up a sizable portion of this heterogeneous category which totals somewhat less than 1,000 persons.

No single professional group more clearly reflects the simplicity or complexity of health department organization than does the number of physicians employed. It is generally conceded that directors of all health activities except vital statistics, sanitation, public health nursing, health education, dentistry, and business management preferably should be physicians. In health departments where only 2 or 3 physicians are employed, numerous functions are—of necessity—merged and combined under one medical director. On the other hand, in States where health departments employ upwards of 25 physicians, a much greater degree of specialization is possible. Not only are marked differences in the number of separate units operated by State health departments suggested by these figures, but also is diversity in the internal composition of the various bureaus indicated. In health departments employing few medical personnel, the division director often represents the only physician engaged in a particular activity. In those having a lengthy roster of physicians, the division director has several medical assistants. Finally, States that utilize the health district system employ a relatively larger number of physicians than those which do not. A total of nearly 900 medical personnel serve on the health department staffs of the 48 States, the District of Columbia, the Territories, and the Virgin Islands. Physicians employed by the middle 50 percent of the States number from 6 to 20.

Dentists constitute the smallest single professional group. In health departments that have no division of dental hygiene or oral health as a separately defined section, dentists almost always are assigned to the bureau of maternity and child health.

It is obvious, therefore, that no common pattern obtains either for the size of a complete health department staff or for the proportion of personnel of each professional classification which are selected. No attempt has been made to review differences among the States with respect to qualifications of the personnel of each type who are employed.

EXPENDITURES BY STATE HEALTH DEPARTMENTS

In the aggregate, efforts of official State health departments to conserve, improve, and restore the health of individuals and communities are costing nearly 53 million dollars per year,[4] an amount

[4] Because of variations in fiscal periods, figures cover the most recent year for which information was available at the date of interview.

equivalent to $0.395 per capita. These figures include support of the organizational structure and of all activities engaged in by members of the State health department staff, plus financial grants made by this State agency to health departments, hospitals, laboratories, and special health projects operated by counties, cities, or other political subdivisions.

For individual jurisdictions, health department expenditures range from about $103,000 in Nevada to nearly $7,000,000 in New York. (See table 4.) When related to the population involved, however, neither of these States represents an extreme. On a per capita basis, two States (Delaware and Rhode Island), the Territories, the District of Columbia, and the Virgin Islands each reported an expenditure in excess of $1, while Ohio reported the lowest figure ($0.134). In view of the general governmental organization of these jurisdictions, it is to be expected that they should occupy such remote positions. Five of the seven health departments spending more than $1 per person are responsible for operation of State tuberculosis and/or general hospitals—a particularly expensive item in the complete health department program. Furthermore, the District of Columbia health agency has no counterparts operating at a lower level since its functions more closely resemble those of a city than of a State health department. In other words, both in the District of Columbia and in the Virgin Islands the central government carries the entire burden. Delaware and Rhode Island, likewise, administer a relatively large volume of direct health service through the State central and district offices rather than through local health units. Ohio, on the other hand, follows an organizational scheme in which the county and other local governmental units are dominant. Consequently, it is the policy here for the State to rely in large measure upon these local units to provide the bulk of health services. The middle 50 percent of the States expend between 25 and 50 cents per capita for operation of State health departments.

TABLE 4.—*Approximate total and per capita annual expenditures* by the health departments of each State and Territory, the District of Columbia, and the Virgin Islands, and proportion of the total amount which was expended for each of several broad categories of service*

State or Territory	Approximate annual health department expenditure*		Percent of total expended for each service category			
	Total	Per capita	Central office services	Field services	Local grants	Hospitals
Total	$52, 896, 200	$0 395	23 3	35 2	21 3	20 2
Alabama	1, 145, 900	. 404	21 4	32 0	46 6	----------
Arizona	176, 700	354	40. 3	20 9	38 8	----------
Arkansas	642, 400	330	22. 7	20 3	57 0	----------
California	2, 451, 400	. 355	17. 8	43. 4	38 8	----------
Colorado	463, 300	. 412	38 9	44. 1	17 0	----------
Connecticut	562, 000	329	38 2	56 7	5 1	----------
Delaware	448, 300	1. 682	25 3	25 5	5 1	44 1
District of Columbia	2, 658, 500	4. 009	12 4	29 2	----------	58 4
Florida	551, 800	291	38 1	41 8	20 1	----------
Georgia	1, 145, 700	367	30 6	34 3	19 6	15 5
Idaho	253, 400	. 483	31. 0	47 4	21 6	----------
Illinois	1, 544, 700	196	18 8	72 0	9 2	----------
Indiana	664, 900	194	25 6	65 0	9. 4	----------
Iowa	478, 600	189	33 1	58 8	8 1	----------
Kansas	405, 000	225	28 9	40 9	30 2	----------
Kentucky	1, 010, 500	. 355	21 7	16 2	50 9[a]	11 2
Louisiana	1, 027, 700	435	17 9	53 4	28 7	----------
Maine	370, 700	. 438	21 9	78 1	----------	----------
Maryland	763, 500	. 419	32 5	13 9	53 6	----------
Massachusetts	3, 793, 400	879	7 3	41 0	13 8	37 9
Michigan	1, 321, 000	. 251	51. 4	18 2	30 4	----------
Minnesota	694, 300	. 249	21 8	74 4	3 8	----------
Mississippi	909, 100	. 416	22. 7	17 5	39 2	20 6
Missouri	721, 000	. 191	24. 5	61 3	14 2	----------
Montana	168, 200	. 301	27 0	41 7	31 3	----------
Nebraska	258, 700	. 197	54 4	45 6	----------	----------
Nevada	102, 900	. 933	57 4	42 6	----------	----------
New Hampshire	207, 400	. 422	36 0	57 6	6 4	----------
New Jersey	918, 400	. 221	26. 0	67 9	6 1	----------
New Mexico	222, 100	. 418	43 0	18 5	38 5	----------
New York	6, 990, 400	519	[a] 33 6	[a] 11 6	16 3	38 5
North Carolina	1, 183, 900	. 331	21 9	34 1	44 0	----------
North Dakota	176, 600	. 275	33 9	47 3	18 8	----------
Ohio	926, 200	. 134	24 9	19 2	55 9	----------
Oklahoma	541, 200	. 232	32 0	34 9	33 1	----------
Oregon	284, 100	. 261	29. 3	29 6	41 1	----------
Pennsylvania	3, 693, 200	. 373	20 1	37 5	----------	42 4
Rhode Island	792, 600	1. 111	12. 9	30. 7	----------	56 4
South Carolina	886, 000	. 466	11 6	31 6	28 3	28 5
South Dakota	204, 800	. 319	21 3	43. 2	35 5	----------
Tennessee	1, 133, 400	. 389	28 7	40 1	31. 2	----------
Texas	1, 127. 400	. 178	26 5	36. 4	37. 1	----------
Utah	445, 900	. 810	12 9	68 0	1 6	17 5
Vermont	181, 600	. 506	30 6	69 4	----------	----------
Virginia	1, 872, 900	. 700	11. 4	30 4	22 3	35. 9
Washington	286, 900	. 165	38. 5	24 5	37 0	----------
West Virginia	395, 100	. 208	43. 5	22 7	33 8	----------
Wisconsin	643, 400	. 205	33. 8	58. 2	8. 0	(b)
Wyoming	109, 300	. 436	16. 7	83. 3	----------	----------
Alaska	171, 200	2 344	22. 8	70. 1	7. 1	----------
Hawaii	1, 115, 400	2. 635	19 0	40 7	40 3	----------
Puerto Rico	3, 507, 200	1. 876	12 5	28 6	24 0	34 9
Virgin Islands	146 000	5 866	10 4	20. 1	----------	69 5

* Because of variations in fiscal periods, figures cover the most recent year for which information was available at the date of interview.

[a] Because of New York's method of operation and reporting, it was not feasible to segregate all costs for the 19 State health districts from expenditures for general administration. Therefore, the proportion recorded for "central services" is inflated, while expenditures for "field services" appear to be much lower than is actually the case.

[b] Although operation of tuberculosis hospitals is now a function of the health department in Wisconsin, records for a complete fiscal year were not available under the new administrative set-up.

Further study of the fiscal data submitted by State health departments reveals that not only do gross and per capita expenditures vary markedly from State to State, but the purposes for which such funds were used are inconstant also. This lack of uniformity is

demonstrated in table 4. For facility of comparison, four broad categories of health department service have been established. The first, "central office services," includes expenditures for all general administrative and supervisory activities (general administration, local health administration, accounting procedures, maintenance of personnel records, law enforcement, supervision and coordination of public health nursing activities, and administration of the merit system), collection and processing of vital statistics, health education—both for the general public and for professional health workers, laboratory services, and licensure of professions and facilities rendering health services. The second, "field services," covers disbursements for all activities of the State health department carried on by its own staff in connection with specific health objectives such as general communicable disease control, tuberculosis control—exclusive of hospitalization, venereal disease control, maternity and child health services, sanitation in its broadest concept, pneumonia services, cancer services, mental hygiene, dentistry, and general medical care of the needy. The third category, "local grants," represents money allocated by State health departments to local health units, hospitals, or laboratories for services approved by the State but administered by some unit of local government. Local financial participation in the same projects is not included. Finally, the fourth service group, "hospitals," refers to expenditures for the maintenance and operation of all State hospitals, irrespective of whether such institutions are for treatment of special conditions such as tuberculosis, crippling disorders of children, cancer, trachoma, and rheumatism or for general medical care of the needy.

For the country as a whole, field services receive the highest proportion of health department funds, 35 percent of the total, while each of the other classes of service accounts for not less than 20 nor more than 23 percent. Within the separate States, however, this harmony is completely lacking. For instance, several State health departments spend more than three-fourths of their entire financial resources upon field services, while some concentrate as much as 70 percent of their total funds on hospital care. Other States follow the plan of allotting to local health units, hospitals, and laboratories more than half of all money available to the State health agency, and in still other jurisdictions more than 50 percent is devoted to central office services. Perhaps the clearest understanding of the extent to which variation exists among State health departments in their allocation of funds to broad types of service may be gained by studying each column of table 4 separately and then comparing the focal points for each.

The proportion of money expended by individual State health departments which is utilized for central office services ranges from

7 to 57 percent, with the middle half of the States reporting that between 20 and 34 percent is charged to central office services affecting all branches of public health work and available to the State as a whole and to general management of the organization. Typical of the services affecting all branches of public health work are activities related to the collection, processing, and preservation of vital statistics; laboratory services; training of public health personnel; refresher courses for private practitioners; educational measures for the general public; and licensure of professions and facilities rendering health service. Under general management are included direction of public relations, coordination of operating bureaus, carrying out necessary fiscal procedures, administration of merit systems, and law enforcement. Attention should be called to the fact that not all of the variation noted in the distribution of health department funds results from disagreement regarding the category of service to be emphasized. Some of it is explained by difference in accounting practices. Occasionally purchase of equipment and supplies, and travel for the entire department are charged to general administration rather than to the recipient divisions which are engaged in field services. In another State, because of its method of reporting, it was impossible to segregate operating costs for 19 State health districts from expenditures for general administration. Both of these irregular circumstances—which fortunately occur so seldom that the general picture is not distorted—lead to an inflated proportion for "central services" in the particular States involved, while expenditures for "field services" there appear to be much lower than they are in actuality.

A marked degree of health department concentration upon "field services" is apparent, not only from the leading position of such activities among other categories of service for the country as a whole, but also from the number of States in which there is a relatively high investment in field activities (health services related to specific problems). Fifteen State health departments reported that more than 50 percent of their total disbursements were expended for field services. Outstanding among such services are epidemiological investigations; operation of diagnostic and treatment clinics of various types; performance of immunizations; provision of field nursing service; distribution of drugs and biologicals for preventive and therapeutic purposes; physical inspection of school children; and sanitation activities. In only a dozen States was less than 25 percent of the total amount expended devoted to health department endeavors such as those listed. This grouping of the States is in striking contrast to that observed for "central office services" in which half of the States fall below the 25 percent mark.

Support of local health services through distribution of financial grants-in-aid by the central health agency was practiced to some

extent in all but 9 of the States and Territories at the time of this survey. Within discrete States, the proportion of State health department funds that are, in turn, allocated to local units stretches from 2 to 57 percent of the total. Four State health departments allot more than half of their entire financial assets to their local counterparts, but State participation in local health services to this degree is the exception rather than the rule. The more common policy of State health agencies is to assign smaller amounts to local health projects. Exclusive of the 9 States which made no contribution whatever to local efforts for improvement of the public health, 21 allotted to local health services less than one-fourth of the total amount they expended.

In only 14 of the 53 health departments does operation of any type of State hospital fall within the jurisdiction of the health department. Even in these 14 States, the proportion of total health department funds expended for hospital maintenance and operation varies from 11 to 70 percent. Nine of these States allot more than one-third of their health department resources for hospital administration, while 3 of them spend more than one-half of the total amount for this purpose.

Differences, such as those which have been pointed out, in application of health department funds are further indications of diversity of pattern in the organization and functions of State health departments. That dissimilarity exists also in the source of financial support of State health agencies is demonstrated by the information presented in table 5. From this tabulation one learns that—for the country as a whole—the bulk of money expended by State health departments (63 percent of the total) is appropriated by State legislative bodies, while about one-third of the entire cost is borne by the Federal Government through its system of grants-in-aid. Federal assistance has been extended to State health departments under authority of two pieces of special legislation—(1), titles V and VI of the Federal Social Security Act, and (2), the Venereal Disease Control Act. Title V funds are distributed to States for maternity and child health services and for correction or alleviation of the crippling conditions of children. The purposes to be accomplished by title VI grants are stabilization of the basic health department structure, development of better organization, promotion or extension of health services for which no particular financial arrangement has been made, and training of personnel. Venereal disease control funds, as the designation implies, are utilized exclusively for reduction of the incidence of the venereal diseases. Less than 2 percent of the full amount reported as State health department expenditures represents contributions of local governments to the State agency, while scarcely more than this fraction is derived from miscellaneous sources, notably

contributions by voluntary organizations having special health interests, license and inspection fees, and scattered service charges such as those made for water analyses or for furnishing copies of vital statistics records.

TABLE 5.—*Approximate total and per capita annual expenditures* by the health departments of each State and Territory, the District of Columbia, and the Virgin Islands, and proportion of the total amount which was derived from each specified*

State or Territory	Approximate annual health department expenditure*		Percent of total derived from each source					
	Total	Per capita	State	Local	U. S. Public Health Service Title VI	U. S. Public Health Service V. D. funds	U. S. Children's Bureau Title V	Other
Total	$52,896,200	$0.395	63.1	1.6	17.1	5.3	10.4	2.5
Alabama	1,145,900	.404	42.1	-------	25.7	12.4	12.7	7.1
Arizona	176,700	.354	25.7	-------	31.6	7.8	33.8	1.1
Arkansas	642,400	.330	36.1	-------	34.8	15.7	12.8	0.6
California	2,451,400	.355	62.7	4.9	12.8	6.9	10.5	2.2
Colorado	463,300	.412	31.4	6.1	26.9	7.0	28.6	-------
Connecticut	562,000	.329	65.4	-------	17.7	4.4	12.5	-------
Delaware	448,300	1.682	78.3	-------	9.5	1.2	11.0	-------
District of Columbia	2,658,500	4.009	93.4	-------	2.4	0.2	4.0	-------
Florida	551,800	.291	41.9	-------	24.5	5.8	17.3	10.5
Georgia	1,145,700	.367	57.5	0.3	25.6	5.2	11.4	-------
Idaho	253,400	.483	38.5	-------	28.6	5.8	27.1	-------
Illinois	1,544,700	.196	55.7	-------	27.4	7.2	8.9	0.8
Indiana	664,900	.194	50.2	1.6	29.2	8.0	11.0	-------
Iowa	478,600	.189	33.9	5.5	37.7	8.4	10.3	4.2
Kansas	405,000	.225	32.9	-------	33.6	13.0	17.6	2.9
Kentucky	1,010,500	.355	54.9	-------	22.4	5.6	10.0	7.1
Louisiana	1,027,700	.435	70.2	-------	16.6	3.4	9.8	-------
Maine	370,700	.438	34.1	5.2	17.5	2.3	24.6	16.3
Maryland	763,500	.419	57.5	-------	17.1	3.2	22.2	-------
Massachusetts	3,793,400	.879	87.9	-------	5.6	1.6	4.9	-------
Michigan	1,321,000	.251	47.0	1.2	20.8	8.6	8.4	14.0
Minnesota	694,300	.249	44.7	11.1	26.5	4.6	11.1	2.0
Mississippi	909,100	.416	51.4	-------	23.4	10.4	11.2	3.6
Missouri	721,000	.191	32.0	5.0	37.6	10.7	14.5	0.2
Montana	168,200	.301	36.0	-------	34.5	1.6	27.9	-------
Nebraska	258,700	.197	17.0	4.0	22.2	3.0	12.7	41.1
Nevada	102,900	.933	22.2	10.5	30.7	3.0	32.1	1.5
New Hampshire	207,400	.422	41.6	-------	24.4	5.8	26.7	1.5
New Jersey	918,400	.221	58.5	-------	24.4	7.3	9.8	-------
New Mexico	222,100	.418	27.7	-------	32.2	3.9	36.2	-------
New York	6,990,400	.519	85.0	-------	8.4	2.6	3.9	0.1
North Carolina	1,183,900	.331	36.0	-------	26.4	4.4	19.4	13.8
North Dakota	176,600	.275	32.2	3.4	33.9	1.4	25.5	3.6
Ohio	926,200	.134	40.5	-------	33.4	14.5	11.6	-------
Oklahoma	541,200	.232	34.2	-------	34.5	16.3	7.8	7.2
Oregon	284,100	.261	27.9	-------	32.3	10.4	23.9	5.5
Pennsylvania	3,693,200	.373	78.2	-------	10.7	3.2	7.9	-------
Rhode Island	792,600	1.111	84.1	-------	6.9	1.3	6.5	1.2
South Carolina	886,000	.466	50.9	2.5	22.0	5.8	17.9	0.9
South Dakota	204,800	.319	27.8	-------	36.0	3.1	33.1	-------
Tennessee	1,133,400	.389	32.3	8.3	26.6	5.9	15.0	11.9
Texas	1,127,400	.178	22.8	-------	37.0	23.1	16.0	1.1
Utah	445,900	.810	53.8	7.8	15.3	3.1	19.4	0.6
Vermont	181,600	.506	38.8	3.4	23.7	0.6	29.7	3.8
Virginia	1,872,900	.700	55.5	16.5	13.6	5.7	8.4	0.3
Washington	286,900	.165	35.0	-------	37.1	14.4	12.3	1.2
West Virginia	395,100	.208	36.9	-------	37.7	5.8	13.5	6.1
Wisconsin	643,400	.205	44.9	-------	24.8	3.5	9.0	17.8
Wyoming	109,300	.436	36.5	0.3	25.2	1.5	36.5	-------
Alaska	171,200	2.344	17.3	14.3	23.7	1.2	40.7	2.8
Hawaii	1,115,400	2.635	84.4	1.0	5.2	1.2	5.6	2.6
Puerto Rico	3,507,200	1.876	81.7	-------	7.5	3.4	7.4	-------
Virgin Islands	146,000	5.866	85.7	-------	11.8	2.5	-------	-------

* Because of variations in fiscal periods, figures cover the most recent year for which information was available at the date of interview.

In the break-down of health department expenditures by source of funds, as in practically all analyses of fiscal data submitted by State health agencies, national averages fail to reveal situations within individual jurisdictions. In support of this statement, it is found that although nearly two-thirds of the aggregate amount expended by State health departments of the entire country is appropriated by State legislative bodies, 31 departments reported that less than 50 percent of their operating costs were derived from this source. Consequently, it is appropriate that some consideration should be given the monetary support of a few departments selected at random, which represent extremely divergent financial constitution. The health department of Nebraska, for example, receives from State taxes only 17 percent of the total sum it spends. Here a sizable portion (41 percent) is acquired from examining and licensing fees. Other health departments to which the respective States appropriate less than 25 percent of the operating costs are Nevada, Texas, and Alaska. In each of these jurisdictions, Federal aid is relied upon to meet the major portion of the health department's obligations. By way of contrast, it is observed that the State treasury supplies more than three-fourths of the money expended by health departments of the District of Columbia, Massachusetts, the Virgin Islands, New York, Hawaii, Rhode Island, Puerto Rico, Pennsylvania, and Delaware. Since administration and support of one or more State hospitals is included in the functions of each of these departments, the financial picture is weighted accordingly.

Federal aid, which, in large measure, has been extended to State health departments on a basis of financial need and special health problems, represents, in practically all instances, the major augmentation to State appropriations for State health department operation. At the same time, the financial structure of nearly a dozen health departments contains other consequential elements. In these States, participation by local official agencies or amounts obtained from miscellaneous sources (principally fees and contributions by voluntary agencies) account for upwards of 10 percent of the total.

Not only are there sharp distinctions among the States as to the relative amount of assistance granted health departments from all forms of Federal aid combined, but there is dissimilarity also with respect to the particular Federal fund which predominates. For separate States, title VI grants represent anywhere from 2 to 38 percent of the health department disbursements, while venereal disease control funds make up less than 1 percent of the total in one jurisdiction and more than 23 percent in another. Title V funds, likewise, account for as little as 4 or as much as 40 percent of the entire outlay for health department operation. Variation in the weight of title V funds may be explained partially by the fact that not all

health departments are responsible for administration of crippled children's programs, for which a substantial fraction of title V money is allotted.

It cannot be said that the purchasing power of a State completely governs the sum utilized for maintenance and operation of the health department. When the States were arrayed in declining order of wealth—measured by per capita spendable money income,[5] divided into quarters, and the median per capita health department expenditure determined for each quarter, the results were as follows: Wealthiest quarter, $0.436; second quarter, $0.346; third quarter, $0.258; and poorest quarter, $0.378. These findings indicate that States lowest in the scale of wealth have accelerated their efforts to meet special health problems, irrespective of their financial limitations. This performance of the poorest quarter has been influenced in part by the allocation formula used by the Federal Government for regulation of grants-in-aid, whereby added weight is given to the financial need and special health problems of the respective States. Except in the case of this single group, State wealth appears to be a substantial element in determining the amount allocated by the various States to health services.

Analysis of expenditures by geographic position[6] of the several States reveals that health department disbursements of the Northeastern, Western, and Southern areas are appreciably higher than are those of the Central States. Median per capita expenditures of each are cited herewith: Northeastern, $0.472; Western, $0.412; Southern, $0.361; and Central, $0.201. It is recognized, of course, that there is interrelationship between geographic location and wealth, thus making it difficult to segregate the exact weight of either State characteristic. However, in view of the very marked differences which were found, it is believed that location as well as wealth is a contributing element. The fact that States of the central grouping are relatively wealthy, yet geographically rank lowest from the standpoint of per capita expenditures, is a good example of the influence of location.

[5] Martin, John L., National Income Division, Department of Commerce: Income Payments to Individuals by States, 1929-39. Survey of Current Business, October 1940.

[6] The established geographic areas with the States contained therein are as follows:

Northeastern: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, and the District of Columbia.

Southern: Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas.

Central: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas

Western. Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, and California.

DISCUSSION

Dissimilarity characterizes State health department organization, for the number of component bureaus, divisions, and subdivisions—each with a director or chief responsible for the unit's activities—may vary from 6 to 20. Furthermore, no constant plan is followed in the combining of activities when several health programs are administered within a single bureau or division. The division of preventable diseases or epidemiology may operate for control of the general communicable diseases only, or it may include venereal disease control, tuberculosis control, or both. In a few instances, cancer services are performed through the division of preventable diseases. In still other States epidemiology and local health administration are combined under one director. Again, local health administration may be associated with rural sanitation. Crippled children's services are sometimes set up as a separate division; in another State, they are administered by the bureau of maternity and child health; in still another, they are merged with communicable disease control, while under yet another arrangement they are handled by the administrative office of the State health officer. Cancer service, likewise, or even tuberculosis control, is occasionally delegated to the immediate supervision of the State health officer. Public health nursing may be organized as a separate entity or it may be an adjunct of the division of maternity and child health. Dental hygiene, also, sometimes has separate existence and again is a subsidiary unit of the maternity and child health set-up. Hotel and restaurant sanitation is some States falls within the province of the food and drug division; in others it is a function of the division of sanitary engineering; and in a third group there is a special inspectional unit created specifically for this purpose.

Notwithstanding the many differences in the internal make-up of State health departments, there are certain salient organizational characteristics which are more or less uniform. Each State health agency is composed of a policy-forming or advisory body, an executive officer, and an administrative department composed of several bureaus or divisions dealing with particular health specialties. Even within the administrative departments, certain dissimilarities of which have been delineated, there is almost always a basic formation made up of a general adminstrative office, a public health laboratory, and bureaus of epidemiology, vital statistics, sanitary engineering, and maternity and child hygiene.

The executive officer of the State health department is appointed by the Governor in 28 States and by the State board of health in 21. In the 4 remaining jurisdictions, miscellaneous practices are followed.

The States are almost evenly divided as to whether or not the State health officer should be a member of the State board of health. Functions of the State board of health vary from those which are solely advisory to those which are completely regulatory, including the exercise of executive and police powers for enforcement of all State laws pertaining to public health. Under the latter system, the executive officer and members of the health department serve as agents of the board for performance of enforcement obligations.

For the entire country the roster of State health department employees numbers in excess of 11,000. Alaska has the smallest staff, with 28 members, and New York the largest, with 1,282. Thus the picture of disparity in organization is intensified. Proportionate composition as well as size of the staff varies from State to State. The degree of specialization in health department organization and activity is reflected particularly by the number of physicians employed. In departments having only two or three, numerous functions are assigned to one medical director, thus limiting the time and attention he is able to give to any specific problem. For the country as a whole, clerical and records personnel outnumber health department employees of any other classification. Nurses rank next in numerical order, and sanitation personnel—engineers, milk specialists, and general sanitary inspectors—are third.

Aggregate expenditures of State health departments, reaching nearly $53,000,000 per year and amounting to $0.395 per capita, are not evenly distributed among the individual States. One jurisdiction reported disbursement of more than $5 per person, while another reported a corresponding outlay of less than $0.15. These differences further illustrate the variations which typify State health department organization and activity. Inclusion of hospital administration among the health department functions is a particularly important determinant in these differences. Although financial aid from the Federal Government has, to some extent, lessened the effect of State wealth upon the amount of money expended for operation of State health department services, it does not entirely counterbalance the effect of a State's ability to purchase service. For the country as a whole, about one-third of the total amount expended by State health departments represents Federal grants; however, there are some jurisdictions in which this proportion reaches approximately 75 percent. Geographic position appears to be another influential factor which operates for unlikeness in health department expenditures, but perhaps the most weighty constituent is one which cannot be computed in exact terms, namely, the complementary health service rendered at the local level.

Although National averages indicate relatively even allotment of State health department funds to the four broad categories of service

labeled "central office services," "field services," "local grants," and "hospitals," this regularity does not obtain among all States. Neither is there a uniform pattern for concentration upon any single service category.

DEATHS DURING WEEK ENDED MARCH 20, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Mar. 20, 1943	Corresponding week, 1942
Data for 88 large cities of the United States:		
Total deaths	9,838	8,865
Average for 3 prior years	8,964	
Total deaths, first 11 weeks of year	110,978	101,960
Deaths under 1 year of age	693	558
Average for 3 prior years	519	
Deaths under 1 year of age, first 11 weeks of year	7,857	6,199
Data from industrial insurance companies:		
Policies in force	65,444,262	64,938,889
Number of death claims	13,266	13,541
Death claims per 1,000 policies in force, annual rate	10 6	10.9
Death claims per 1,000 policies, first 11 weeks of year, annual rate	10.7	10.3

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 27, 1943

Summary

Reports received for the current week show that, of the 9 communicable diseases included in the following tables, the incidence of only measles and meningococcus meningitis is above the 5-year (1938–42) medians. Increases over the preceding week's figures were reported for only diphtheria and measles.

A total of 572 cases of meningococcus meningitis was reported for the week, as compared with 614 for the preceding week. The cumulative total for the first 12 weeks of the year is 5,231, as compared with 842 for the same period in 1942 and with 3,161 for the first 12 weeks of 1930, the largest number recorded for the corresponding period of any prior year for which comparable data are available. Current reports show decreases from the average incidence of the past 3 weeks in the West North Central, South Atlantic, East South Central, Mountain, and Pacific States. In the West South Central group a slight decrease is shown from the figures of the week immediately preceding, while in the Pacific States a slight increase was recorded. The largest numbers reported by individual States for the current week, with figures for the preceding week in parentheses, are as follows: New York, 51 (64); Pennsylvania, 44 (32); California, 43 (29); New Jersey, 38 (29); Virginia, 33 (53); Massachusetts, 30 (34); Rhode Island, 29 (24); Michigan, 24 (7); Mississippi, 23 (44); Maine, 20 (12); Texas, 20 (28).

Other reports for the week include: Dysentery, 271; infectious encephalitis, 12; tularemia, 15; and endemic typhus fever, 49.

Deaths recorded during the week in 89 large cities of the United States aggregated 9,858, as compared with 9,869 for the preceding week and a 3-year average of 9,001. The accumulated figure for the first 12 weeks of the year is 121,158, as compared with 111,297 for the same period of 1942.

Telegraphic morbidity reports from State health officers for the week ended March 27, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42
	Mar. 27, 1943	Mar. 28, 1942		Mar. 27, 1943	Mar. 28, 1942		Mar. 27, 1943	Mar. 28, 1942		Mar. 27, 1943	Mar. 28, 1942	
NEW ENG.												
Maine	0	1	0	2	2	2	5	151	151	20	1	0
New Hampshire	0	0	0	1	5	1	29	18	18	1	0	0
Vermont	0	0	0	----	----	----	387	39	24	1	0	0
Massachusetts	1	1	3	----	----	----	1,706	929	700	30	8	4
Rhode Island	0	1	0	----	----	----	31	243	18	29	0	0
Connecticut	0	0	2	4	----	6	349	518	94	7	2	0
MID. ATL.												
New York	30	31	30	[1] 12	[1] 11	[1] 28	2,413	563	1,615	51	20	5
New Jersey	6	1	4	15	16	16	1,526	672	672	38	3	1
Pennsylvania	10	10	21	2	----	----	2,362	1,206	1,206	44	8	5
E. NO. CEN.												
Ohio	2	12	6	16	14	14	634	260	260	7	0	0
Indiana	4	14	14	23	36	38	262	155	155	9	0	1
Illinois	12	29	24	17	35	35	1,262	741	741	14	2	1
Michigan [2]	3	6	6	20	3	3	904	232	289	24	2	2
Wisconsin	6	3	1	44	24	184	1,260	886	886	3	1	0
W. NO. CEN.												
Minnesota	5	5	0	1	1	2	121	786	214	4	0	0
Iowa	1	4	3	----	----	9	393	395	169	0	0	0
Missouri	2	5	9	5	1	71	586	645	384	19	2	2
North Dakota	0	1	1	9	5	8	61	78	64	1	0	0
South Dakota	2	7	0	----	1	1	202	14	3	0	0	0
Nebraska	0	3	2	3	19	7	349	239	85	2	0	0
Kansas	12	2	3	11	12	14	760	608	608	5	0	0
SO. ATL.												
Delaware	0	0	0	----	----	----	136	7	7	1	0	0
Maryland [2]	3	1	2	6	8	19	91	632	196	17	6	1
Dist. of Col	0	0	3	1	4	2	91	88	68	6	2	1
Virginia	8	6	11	404	524	524	692	298	427	33	4	3
West Virginia	3	4	8	20	67	67	73	280	280	1	2	3
North Carolina	9	8	15	180	68	68	111	1,028	1,085	14	2	1
South Carolina	6	3	6	920	435	559	127	259	259	13	2	1
Georgia	5	6	8	79	84	141	298	216	216	7	2	1
Florida	1	2	5	14	4	10	65	171	178	3	0	1
E. SO. CEN.												
Kentucky	3	4	6	14	19	38	752	106	137	13	4	3
Tennessee	3	6	5	96	47	117	401	118	118	9	0	1
Alabama	13	5	6	264	228	269	342	495	495	8	4	2
Mississippi [3]	1	2	6	----	----	----	----	----	----	23	0	0
W. SO. CEN.												
Arkansas	4	4	8	114	172	187	96	172	172	4	1	1
Louisiana	2	10	8	10	----	14	197	100	100	14	1	2
Oklahoma	3	7	7	76	143	165	74	264	86	8	0	1
Texas	41	35	35	1,243	1,049	1,277	1,359	2,914	800	20	2	2
MOUNTAIN												
Montana	0	3	2	43	14	4	320	53	53	0	0	0
Idaho	0	1	0	5	3	----	101	92	82	2	0	0
Wyoming	0	2	1	40	130	2	191	71	61	1	0	0
Colorado	15	10	9	19	56	23	772	238	238	3	0	0
New Mexico	1	1	1	3	18	15	33	130	116	0	0	1
Arizona	0	0	2	138	165	173	53	204	20	0	0	0
Utah [3]	2	0	1	11	39	22	354	266	266	2	0	0
Nevada	0	0	----	----	----	----	50	52	----	0	0	----
PACIFIC												
Washington	2	1	1	6	5	8	686	291	291	8	3	0
Oregon	1	0	3	34	36	36	438	144	144	10	0	0
California	24	15	16	91	252	181	1,127	6,343	541	43	6	4
Total	246	272	289	4,016	3,755	4,438	24,632	24,410	24,410	572	90	52
12 weeks	3,437	3,814	4,668	53,969	57,885	100,056	184,225	183,023	183,023	5,231	842	688

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 27, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42
	Mar. 27, 1943	Mar. 28, 1942		Mar. 27, 1943	Mar. 28, 1942		Mar. 27, 1943	Mar. 28, 1942		Mar. 27, 1943	Mar. 28, 1942	
NEW ENG.												
Maine	0	0	0	6	20	17	0	0	0	0	0	0
New Hampshire	0	0	0	22	36	4	0	0	0	0	0	0
Vermont	0	0	0	21	5	7	0	0	0	0	0	0
Massachusetts	2	0	0	606	388	194	0	0	0	0	1	0
Rhode Island	0	0	0	17	16	16	0	0	0	0	0	0
Connecticut	0	0	0	78	41	81	0	0	0	0	1	1
MID. ATL.												
New York	0	2	0	587	545	699	0	0	0	6	4	4
New Jersey	0	0	0	160	174	225	0	0	0	1	1	1
Pennsylvania	2	0	0	323	603	417	0	0	0	2	7	8
E. NO. CEN.												
Ohio	1	0	0	249	261	310	1	0	5	2	2	3
Indiana	0	1	1	[3] 76	132	182	[3] 4	2	6	4	3	1
Illinois	0	2	2	210	311	520	1	1	5	3	1	4
Michigan [3]	0	1	0	126	284	287	0	1	2	5	2	2
Wisconsin	1	0	0	294	148	148	0	0	1	2	0	0
W. NO. CEN.												
Minnesota	0	0	0	41	95	95	0	0	5	0	1	0
Iowa	0	0	0	67	79	79	0	0	13	0	0	1
Missouri	0	1	0	110	125	125	0	2	8	2	1	2
North Dakota	0	1	0	3	23	16	0	0	1	0	0	0
South Dakota	0	0	0	18	46	18	0	0	1	0	0	0
Nebraska	0	0	0	34	54	31	0	0	0	0	0	0
Kansas	0	1	0	96	106	106	0	0	1	0	0	1
SO. ATL.												
Delaware	0	0	0	11	60	14	0	0	0	0	0	0
Maryland [3]	0	0	0	107	81	55	0	0	0	0	0	0
Dist. of Col.	0	0	0	20	13	23	0	0	0	0	0	0
Virginia	0	0	0	55	33	33	0	0	0	1	2	3
West Virginia	0	1	0	39	31	42	0	0	0	0	1	2
North Carolina	0	0	0	26	25	37	3	0	0	5	0	0
South Carolina	0	1	0	10	0	4	0	0	0	0	1	1
Georgia	1	1	1	14	10	10	0	0	0	1	6	3
Florida	[3] 1	0	0	4	1	8	0	0	0	1	5	2
E. SO. CEN.												
Kentucky	0	0	1	55	81	105	2	1	1	0	0	1
Tennessee	0	0	0	40	47	47	0	1	1	1	2	2
Alabama	0	2	1	17	18	16	0	0	1	1	4	2
Mississippi [3]	0	0	0	16	6	6	1	1	0	1	4	3
W. SO. CEN.												
Arkansas	0	1	1	16	2	6	1	2	3	2	1	3
Louisiana	0	0	0	10	1	11	0	2	0	6	2	3
Oklahoma	0	0	1	14	17	24	3	2	2	1	0	2
Texas	8	2	1	36	40	59	2	4	6	2	6	11
MOUNTAIN												
Montana	0	0	0	6	23	21	0	0	0	0	0	0
Idaho	0	0	0	3	6	6	0	0	1	0	0	0
Wyoming	0	0	0	57	9	9	0	0	0	0	0	1
Colorado	0	1	0	57	37	37	1	0	2	0	0	1
New Mexico	0	0	0	2	10	10	0	0	0	1	2	2
Arizona	0	0	0	25	8	8	0	0	0	2	0	0
Utah [3]	1	0	0	61	42	22	0	0	0	0	0	0
Nevada	0	0	------	1	2	------	0	0	------	0	0	------
PACIFIC												
Washington	0	1	0	42	53	46	0	0	1	0	1	2
Oregon	0	0	1	19	13	18	0	0	2	0	0	1
California	1	5	2	200	99	177	0	0	4	1	4	3
Total	18	24	24	4,107	4,260	4,912	19	19	72	53	65	89
12 weeks	[3] 320	290	290	[3] 46,702	48,344	56,107	[3] 319	265	882	638	907	916

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 27, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Whooping cough: Week ended Mar. 27, 1943	Whooping cough: Week ended Mar. 28, 1942	Whooping cough: Median 1938–42	Week ended March 27, 1943: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENG.												
Maine	37	43	52	0	0	0	0	0	0	0	0	0
New Hampshire	3	24	4	0	0	0	0	0	0	0	0	0
Vermont	16	47	32	0	0	0	0	0	0	0	0	0
Massachusetts	232	251	189	0	0	1	0	1	0	0	0	0
Rhode Island	50	49	25	0	0	0	0	0	0	0	0	0
Connecticut	57	72	72	0	0	0	0	0	0	0	0	1
MID. ATL.												
New York	368	455	449	0	17	8	0	1	0	0	0	0
New Jersey	227	236	199	0	0	0	0	1	0	0	0	0
Pennsylvania	321	211	281	0	0	1	0	0	0	0	0	0
E. NO. CEN.												
Ohio	167	195	195	0	0	0	0	0	0	0	0	0
Indiana	34	41	41	0	0	0	0	0	0	0	0	0
Illinois	138	194	114	0	2	0	0	2	0	0	0	0
Michigan [2]	233	201	199	0	0	0	0	0	0	0	0	0
Wisconsin	192	146	126	0	0	0	0	0	0	0	1	0
W. NO. CEN.												
Minnesota	76	38	42	0	1	0	0	1	0	0	0	0
Iowa	27	19	19	0	0	0	0	1	0	0	0	0
Missouri	30	20	27	0	0	0	1	0	0	0	0	0
North Dakota	17	8	9	0	0	0	0	0	0	0	0	0
South Dakota	0	9	9	0	0	0	0	0	0	0	0	0
Nebraska	10	27	9	0	0	0	0	0	0	0	0	0
Kansas	65	32	39	0	1	0	0	2	0	0	2	0
SO. ATL.												
Delaware	11	3	7	0	0	0	0	0	0	0	0	0
Maryland [2]	91	42	52	0	0	0	1	0	0	0	0	0
Dist. of Col.	33	19	14	0	0	0	0	0	0	0	0	0
Virginia	48	23	68	0	0	0	22	0	0	0	0	0
West Virginia	16	48	48	0	0	0	0	0	0	0	0	0
North Carolina	151	152	271	0	0	0	0	0	0	0	0	3
South Carolina	52	57	111	0	0	0	0	0	0	0	0	2
Georgia	33	29	18	0	2	0	0	0	0	0	2	15
Florida	14	20	20	0	2	2	0	0	0	0	0	14
E. SO. CEN.												
Kentucky	31	105	74	0	0	0	0	0	0	0	3	0
Tennessee	125	23	29	0	1	0	3	0	0	0	3	0
Alabama	43	40	40	0	0	0	0	0	0	0	0	4
Mississippi [2]	------	------	------	0	0	0	0	0	0	0	1	3
W. SO. CEN.												
Arkansas	46	8	20	0	0	0	0	0	0	0	2	0
Louisiana	4	7	13	0	0	0	0	0	0	0	0	1
Oklahoma	27	22	22	0	0	0	0	0	0	0	0	0
Texas	451	187	255	0	5	176	0	2	0	0	0	6
MOUNTAIN												
Montana	8	5	5	0	0	0	0	0	0	0	0	0
Idaho	0	12	11	0	0	0	0	0	0	0	0	0
Wyoming	1	7	1	0	1	0	0	0	0	0	1	0
Colorado	20	18	24	0	0	3	0	1	0	0	0	0
New Mexico	8	11	13	0	0	0	1	0	0	0	0	0
Arizona	19	60	42	0	0	0	17	0	0	0	0	0
Utah [2]	46	44	44	0	0	0	0	0	0	0	0	0
Nevada	1	11	------	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	27	77	77	0	0	0	0	0	0	0	0	0
Oregon	12	18	18	0	0	0	0	0	0	0	0	0
California	435	319	319	0	0	3	0	0	0	0	0	0
Total	4,053	3,685	4,201	0	32	194	45	12	0	0	15	49
12 weeks	47,025	47,294	49,468	------	------	------	------	------	------	------	------	------

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Revised figures show, instead of those previously given, for the week ended Feb. 13, 1943, 1 case of poliomyelitis in Florida, and for the week ended Feb. 27, 1943, 110 cases of scarlet fever and 1 case of smallpox in Indiana.

WEEKLY REPORTS FROM CITIES

City reports for week ended March 13, 1943

This table lists the reports from 87 cities of more than 10,000 population distributed thoughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga	0	0	22	1	11	3	7	0	0	0	0	3
Baltimore, Md	2	0	5	0	36	12	23	0	45	0	0	67
Barre, Vt	0	0		0	2	0	0	0	0	0	0	0
Billings, Mont	0	0		0	0	0	1	0	1	0	0	2
Birmingham, Ala	0	0	12	0	3	0	4	0	2	0	1	3
Boise, Idaho	0	0		0	0	0	0	0	0	0	0	0
Boston, Mass	0	0		1	218	6	16	1	129	0	1	27
Bridgeport, Conn	0	0		0	6	0	1	0	7	0	0	2
Brunswick, Ga	0	0	1	1	6	0	1	0	0	0	0	0
Buffalo, N. Y	0	0		1	115	2	6	0	8	0	0	7
Camden, N. J	1	0	1	0	21	0	2	0	0	0	0	1
Charleston, S. C	0	0	123	0	11	1	5	1	1	0	0	6
Charleston, W. Va	0	0		0	0	0	0	0	4	0	0	0
Chicago, Ill	7	0	6	2	449	7	41	0	56	0	0	63
Cincinnati, Ohio	0	0		0	100	0	6	0	44	0	0	5
Cleveland, Ohio	1	1	6	1	8	2	13	0	62	0	0	40
Columbus, Ohio	0	0	2	2	7	0	6	0	23	0	0	2
Concord, N. H	0	0		0	0	0	2	0	0	0	0	0
Cumberland, Md	0	0		0	1	0	1	0	1	0	0	2
Dallas, Tex	1	0		0	3	2	2	1	3	0	0	8
Denver, Colo	2	0	24	1	443	1	7	0	6	0	0	4
Detroit, Mich	1	0	4	0	209	4	38	0	34	0	0	141
Duluth, Minn	0	0		0	0	0	2	0	16	0	0	9
Fall River, Mass	0	0		0	1	0	1	0	3	0	0	4
Fargo, N. Dak	0	0		0	0	0	0	0	0	0	0	2
Flint, Mich	1	0		0	15	0	0	0	1	0	0	8
Fort Wayne, Ind	0	0		0	0	0	1	0	3	0	0	0
Frederick, Md	0	0		0	1	0	0	0	0	0	0	0
Galveston, Tex	0	0		0	0	0	5	0	1	0	0	0
Grand Rapids, Mich	0	0		0	4	0	2	0	3	0	0	21
Great Falls, Mont	0	0		0	23	1	1	0	0	0	0	3
Hartford, Conn	0	0		0	26	2	0	0	2	0	0	4
Helena, Mont	0	0		0	48	0	0	0	0	0	0	0
Houston, Tex	2	0		0	15	0	9	0	1	0	0	3
Indianapolis, Ind	1	0		0	181	0	10	0	12	0	0	11
Kansas City, Mo	0	0		1	63	4	4	0	67	0	0	4
Kenosha, Wisc	0	0		0	1	0	0	0	1	0	0	1
Little Rock, Ark	0	0		0	1	0	3	0	2	0	0	0
Los Angeles, Calif	5	0	30	0	117	4	7	1	36	0	1	30
Lynchburg, Va	0	0		0	0	0	4	0	0	0	0	18
Memphis, Tenn	0	0	8	2	87	2	9	0	7	0	0	9
Milwaukee, Wis	0	0		0	302	3	5	0	156	0	0	26
Minneapolis, Minn	2	0		1	10	4	4	0	14	0	0	24
Missoula, Mont	0	0		0	3	1	0	0	0	0	0	0
Mobile, Ala	0	0		1	1	0	6	0	2	0	0	0
Nashville, Tenn	0	0		2	75	0	3	0	2	0	0	12
Newark, N. J	0	1	5	0	97	1	4	0	12	0	0	9
New Haven, Conn	0	0		0	3	0	4	0	6	0	0	1
New Orleans, La	0	0	5	3	65	8	13	1	9	0	0	1
New York, N. Y	16	1	12	1	376	44	93	0	329	0	2	77
Omaha, Nebr	0	0		0	10	0	6	0	9	1	0	4
Philadelphia, Pa	1	0	2	1	1,037	11	26	0	133	0	0	80
Pittsburgh, Pa	0	0	4	3	0	2	13	0	7	0	0	33
Portland, Me	0	0		0	0	3	4	0	1	0	0	18
Providence, R. I	0	0	17	0	2	5	2	0	3	0	0	29

City reports for week ended March 13, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Pueblo, Colo	0	0	------	0	3	0	1	0	1	0	0	8
Racine, Wis	0	0	------	0	7	0	0	0	41	0	0	0
Reading, Pa	0	0	------	0	135	0	0	0	4	0	0	6
Richmond, Va	0	0	------	2	12	4	3	0	1	0	0	0
Roanoke, Va	0	0	------	0	0	0	3	0	1	0	0	0
Rochester, N. Y	0	0	------	0	26	1	4	0	12	0	1	26
Sacramento, Calif	0	0	------	0	17	3	4	0	2	0	1	3
Saint Joseph, Mo	0	0	------	1	5	0	1	0	5	0	0	0
Saint Louis, Mo	0	0	4	0	43	5	10	0	17	0	0	10
Saint Paul, Minn	0	0	------	0	5	1	5	0	7	0	0	43
San Antonio, Tex	2	0	1	3	10	0	7	0	2	0	0	1
San Francisco, Calif	0	0	4	2	80	7	14	0	18	0	0	22
Savannah, Ga	0	0	32	7	3	3	1	0	0	0	0	0
Seattle, Wash	0	0	------	3	93	3	4	0	2	0	0	4
Shreveport, La	0	0	------	0	0	0	5	0	1	0	0	0
South Bend, Ind	0	0	------	0	5	0	0	0	1	0	0	3
Spokane, Wash	0	0	------	0	210	1	1	0	0	0	0	2
Springfield, Mass	0	0	------	0	4	0	0	0	77	0	0	0
Superior, Wisc	0	0	------	0	0	0	0	0	1	0	0	0
Syracuse, N. Y	0	0	------	0	26	1	2	0	7	0	0	12
Tacoma, Wash	0	0	------	0	8	0	0	0	0	0	0	2
Tampa, Fla	0	0	------	0	6	0	5	0	1	0	0	0
Terre Haute, Ind	0	0	------	0	0	0	2	0	0	0	0	0
Topeka, Kans	0	0	------	0	96	1	1	0	3	0	0	5
Trenton, N. J	1	0	1	0	51	0	3	0	15	0	0	2
Washington, D. C	0	0	------	0	72	2	14	0	15	0	0	26
Wheeling, W. Va	0	0	------	0	0	0	2	0	1	0	0	8
Wichita, Kans	1	0	------	0	27	0	4	0	5	0	0	5
Wilmington, Del	0	0	------	0	16	1	0	0	1	0	0	1
Wilmington, N. C	0	0	------	0	9	0	7	0	0	0	0	7
Winston-Salem, N. C	0	0	------	0	0	0	0	0	1	0	0	24
Worcester, Mass	0	0	---	0	294	0	10	0	17	0	0	5
Total	47	3	331	43	5,476	168	536	5	1,523	1	7	1,049
Corresponding week 1942	65	2	234	40	4,281	22	553	2	1,663	2	15	1,054
Average, 1938-42	99	------	522	[1] 65	[2] 4,663	------	[1] 538	------	1,611	17	22	1,065

Dysentery, amebic.—Cases: Boston, 1; New York, 26.
Dysentery, bacillary.—Cases: Buffalo, 1; Charleston, S. C., 2; Chicago, 1; Detroit, 2; Los Angeles, 4; New York, 1.
Dysentery, unspecified.—Cases: San Antonio, 4.
Typhus fever.—Cases: Atlanta, 1; New Orleans, 1; New York, 1; Tampa, 1.

[1] 3-year average, 1940-42.
[2] 5-year median.

PLAGUE INFECTION IN TACOMA, WASH.

Plague infection has been reported proved in two pools of fleas from rats, *R. norvegicus*, taken on March 8 in frame buildings in industrial sections of Tacoma, Wash.; one a pool of 68 fleas from 114 rats and the other a pool of 27 fleas from 31 rats.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—January 1943.—During the month of January 1943, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities, as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	20		5		12				37	
Diphtheria	8		5		[1]2		3		18	
Dysentery (amebic)	5	1	1		1		2		9	1
Dysentery (bacillary)	2				2		3	2	7	2
Leprosy							1	2	1	2
Malaria [2]	41	2	6	1	357	2	329	4	733	9
Measles	7				11		2		20	
Meningitis, meningococcus					2				2	
Mumps	22				11		2		35	
Paratyphoid fever					3		2		5	
Pneumonia		20		4	70	1		1	[3] 70	26
Relapsing fever							1		[3] 1	
Scarlet fever					1				1	
Tuberculosis		31		6	11	1		12	[3] 11	50
Typhoid fever	2						1		3	
Whooping cough					4				[3] 4	

[1] Both carriers.
[2] Includes 139 recurrent cases.
[3] Cases reported in the Canal Zone only.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 27, 1943.—During the week ended February 27, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		32	1	147	304	31	63	16	48	642
Diphtheria	1	21	5	21	2	8	1			59
Dysentery (bacillary)				148						148
Encephalitis, infectious									1	1
German measles				32	16	8	3	5	7	71
Influenza		28			153	20			13	223
Measles		31		189	375	48	219	14	117	993
Meningitis, meningococcus		1	1	1	2	1		1		7
Mumps	4	187	74	59	1,246	192	99	156	178	2,190
Poliomyelitis				1						1
Scarlet fever		20	6	124	161	47	38	33	13	442
Tuberculosis (all forms)	2	4	12	114	49	21	18	12	32	264
Typhoid and paratyphoid fever		2		10						12
Undulant fever				2						2
Whooping cough				162	112	31	15	36	10	366

IRAQ

Cerebrospinal meningitis.—The following table shows the numbers of new cases of cerebrospinal meningitis and deaths from the same disease reported in all of Iraq for the first 8 weeks of 1943. The centers of infection are chiefly Baghdad, Hillah, and Basra.

Week ended—	Cases	Deaths	Week ended—	Cases	Deaths
1943			*1943*—Continued		
January 2	4	2	January 30	21	1
January 9	9	1	February 6	16	2
January 16	12	0	February 13	28	0
January 23	5	1	February 20	17	1

JAMAICA

Notifiable diseases—4 weeks ended March 13, 1943.—During the 4 weeks ended March 13, 1943, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	4	3	Puerperal fever		1
Diphtheria	2	2	Tuberculosis	32	63
Dysentery		1	Typhoid fever	7	35
Erysipelas	1		Typhus fever	1	1
Leprosy		3			

SWEDEN

Notifiable diseases—January 1943.—During the month of January 1943, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	9	Poliomyelitis	25
Diphtheria	195	Scarlet fever	2,561
Dysentery	56	Syphilis	44
Epidemic encephalitis	2	Typhoid fever	3
Gonorrhea	1,299	Undulant fever	2
Paratyphoid fever	26	Weil's disease	9

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Peru.—During the month of January 1943, plague was reported in Peru, as follows: Libertad Department—Trujillo, 4 cases; Moche, 1 case; rural, 1 case; Lima Department—Lima, 1 case, 1 death, and rodent plague.

Smallpox

Algeria.—For the period February 11–20, 1943, 49 cases of smallpox were reported in Algeria, including 2 cases in Oran and 2 cases in Philippeville.

Indochina.—For the period January 1 to February 20, 1943, 313 cases of smallpox were reported in Cochinchina and 405 cases in Tonkin, Indochina.

Typhus Fever

Algeria.—For the period February 11–20, 1943, 363 cases of typhus fever were reported in Algeria, including cases reported in certain ports as follows: Algiers, 9; Bone, 6; Philippeville, 19; Oran, 64; Mostaganem, 1.

Germany.—During the first 7 weeks of 1943, 800 cases of typhus fever were reported in Germany.

Hungary.—For the week ended March 6, 1943, 8 cases of typhus fever were reported in Hungary.

Rumania.—For the period March 1–7, 1943, 593 cases of typhus fever, including 31 cases in Bucharest, were reported in Rumania.

Slovakia.—For the week ended February 20, 1943, 8 cases of typhus fever were reported in Slovakia.

Spain.—For the 2 weeks ended February 6, 1943, 21 cases of typhus fever, including 10 cases in Barcelona, were reported in Spain.

COURT DECISION ON PUBLIC HEALTH

Venereal diseases—quarantine—city ordinance upheld.—(Arkansas Supreme Court; *City of Little Rock et al.* v. *Smith*, 163 S.W.2d 705; decided July 13, 1942.) The appellee pleaded guilty to a charge of violating certain sections of an ordinance of the city of Little Rock prohibiting immorality and prostitution. The ordinance also provided that a person convicted of such a violation could be examined and, if found to be infected with a venereal disease in a communicable stage, committed by the city health officer to a hospital or other place designated by such officer as a place of quarantine in the State if such infected person failed to take treatment adequate for the protection of the public health. After her conviction the appellee was detained and examined by the city health officer, found to be venereally infected, and ordered quarantined in the public health center in Hot Springs.

In a habeas corpus proceeding by the appellee the question presented to the Supreme Court of Arkansas was whether the above-mentioned ordinance provisions were valid as being within the police power of the city. The court referred to the proceeding as one to compel the appellee "to be quarantined, segregated, from the public, to the end that she may be cured of the venereal diseases with which she is infected, and that she may not communicate them to others." After reviewing certain statutes, the appellate court was of the view that the State's power to legislate in the protection of the public health had been granted and delegated to municipalities and that its exercise by the city in the instant ordinance provisions must be held to be within the grant unless it could be said that the power conferred on the city health officer was unreasonable. Applying the rule stated in a prior decision, the court found itself unable to say that the power conferred was "clearly outside the scope of reasonable and legitimate regulation."

Relative to a statutory provision that the city council should have "the power to establish a board of health, with jurisdiction for one mile beyond the city limits; and for quarantine purposes, in cases of epidemic, five miles," the court held that this had no reference to the place where a person could be confined for quarantine purposes but referred only to the extent of the jurisdiction beyond the city limits for the better protection of the inhabitants of the city.

Another section of the statutes required the city health officer to perform the duties prescribed for him "under the directions, rules, regulations, and requirements of the State board of health." One of the State board's regulations empowered any health authority, when in his discretion he believed that the public health required it, to "commit any commercial prostitute or other person apprehended

and examined and found afflicted with" certain diseases, "who refuses or fails to take treatment adequate for the protection of the public health, to a hospital or other place in the State." This rule, said the court, "is authority to the city health officer to commit appellee outside the city of Little Rock and to confine her at the Government health center in Hot Springs."

The conclusion of the supreme court was that the ordinance provisions involved were not unconstitutional and void. The judgment of the trial court was reversed and the cause remanded with directions to dismiss the petition for the writ of habeas corpus and to remand appellee into the custody of the sheriff for isolation and quarantine as ordered by the city health officer.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements, should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Aug.

Public Health Reports

'OLUME 58 APRIL 9, 1943 NUMBER 15

IN THIS ISSUE

Relation Between Coliforms and Pathogens

A Report on the Toxicity of Lead Azide

CONTENTS

Public Health Reports

Vol. 58 • APRIL 9, 1943 • *No. 15*

NOTES ON THE RELATION BETWEEN COLIFORMS AND ENTERIC PATHOGENS [1] [2]

By ROBERT W. KEHR,* *Passed Assistant Sanitary Engineer*, and CHESTER T. BUTTERFIELD, *Principal Bacteriologist, United States Public Health Service*

In order that a clear perspective be maintained regarding the value of the coliform [3] test as an indicator of pollution and, therefore, of possible infection with enteric pathogens, it seems worthwhile to present evidence tending to clarify the relationship between coliforms and pathogens. This is particularly true at present inasmuch as the coliform test (*1*) has recently received an adverse decision by the Illinois Supreme Court as to its value in indicating an unsafe water.

During the period of establishment of the coliform group as an indicator of unsafe waters, considerable effort was devoted to the isolation of enteric pathogens, particularly *Eberthella typhosa*, and to the relative rates of decrease of coliforms and enteric pathogens under various conditions. Methods for quantitative isolation of such pathogens were, however, less effective than those available now. The introduction, in 1927, of Wilson and Blair's bismuth sulfite agar has resulted in much work being done on the isolation of certain enteric pathogens during the past 10 or 12 years by a number of

[1] From the Division of Public Health Methods, National Institute of Health, Stream Pollution Investigations, Cincinnati, Ohio.

[2] This paper consists, in part, of certain sections of an unpublished report entitled "A report on the public health aspects of clamming in Raritan Bay," by Robert W. Kehr, Benjamin S. Levine, Chester T. Butterfield, and Arthur P. Miller. The original report includes extensive laboratory studies of pollution of Raritan Bay made under supervision of the U. S. Public Health Service by the New York State Conservation Department, the New Jersey State Department of Health, and the New York City Department of Health.

[3] "Coliform" bacteria are considered as including all aerobic and facultative anaerobic Gram negative nonsporeforming bacteria which ferment lactose with gas formation. This group, as defined, is equivalent to (1) the "*B. coli*" group as used in all editions of Standard Methods of Water Analysis prior to the sixth, (2) the term "coli-aerogenes" group as used in the sixth, seventh, and eighth editions of Standard Methods of Water Analysis, and (3) the term "colon group" in Standard Methods of Milk Analysis.

*It is noted with deep regret that an airplane on which Mr. Kehr was traveling in connection with his work on the Alaska Highway Project disappeared on December 20, 1942, and that no trace of the missing plane had been discovered up to the present writing in March 1943.

investigators. These workers have been successful in isolating *E. typhosa* from sewage and polluted waters, using Wilson and Blair's media or various modifications of it. While it hardly seems necessary to review the literature extensively in this paper, several of these workers, or groups of workers, have made numerous isolations of *E. typhosa* and other enteric pathogens. The work of the London Metropolitan Water Board Laboratories is perhaps the most complete and carefully controlled. Inaugurated by the late Sir Alexander Houston, each report from 1927 to 1938 (*2* to *13*) carries some reference to isolations of enteric pathogens and the total amount of this work is very considerable. It includes isolations or attempted isolations from sewage, sewage treatment plant effluents, and raw Thames River water. A number of the experiments were controlled by adding a known concentration of *E. typhosa* to half of the sample and increasing the estimated concentration of typhosa present by the ratio of $\frac{E.\ typhosa\ \text{added to control}}{E.\ typhosa\ \text{recovered from control}}$. Such results also have value when isolations are not accomplished from the sample, inasmuch as this probably justifies the assumption that on the average *E. typhosa* was absent from a fraction of the original sample equal to the ratio $\frac{E.\ typhosa\ \text{recovered}}{E.\ typhosa\ \text{added}}$ in the control. During the years 1931–1938, the London Metropolitan Water Board Laboratories also examined samples of raw sewage and effluent from the Epping sewage treatment works for *Salmonella schottmuelleri* (*B. paratyphosus B.*). This organism was found to be present in large numbers following an outbreak of 260 cases of paratyphoid at Epping during 1931, a smaller outbreak of 22 cases in 1933, and 2 cases in 1935. This work, together with other studies of a more limited scope by the London Water Board group, constitutes the largest mass of data available on the isolation of enteric pathogens from water and sewage. Wilson (*14*, *15*, *16*) and Wilson and Blair (*17*) have reported numerous isolations of *E. typhosa* from polluted waters, sewage, and the shell liquor of cockles (*14*).

Green and Beard (*18*) have reported the isolation of *E. typhosa* from Palo Alto sewage in 9 of 55 1-ml. samples; Ruchhoft (*19*) has reported isolations in 2 0.1-ml. samples of Chicago activated sludge, while Heukelekian and Schulhoff (*20*) reported failure to isolate *E. typhosa* from the sewages of 15 municipalities in 0.1-ml. amounts. Stewart and Ghosal (*21*) reported isolation of *E. typhosa* from the River Hooghly in India. Hajna (*22*) has reported isolations of *E. typhosa* from 6 of 22 samples of crude sewage, none of the 9 samples of effluent, 3 of 7 samples of raw sludge, and none of 3 samples of digested sludge from Baltimore and vicinity. From this series of

samples 22 strains of *E. typhosa* were confirmed by Hajna. Two *E. typhosa* were isolated by Hajna from 1 ml. of raw sewage containing 11 billion[4] *Esch. coli* per ml.

Mom and Schaeffer (*23*) reported an extensive series of isolations from sewage, sludge, and river water at Bandoeng, Dutch East Indies, where the morbidity rates for typhoid fever are around 30 cases per thousand per year. Wilson (*14*) and Mom and Schaeffer (*23*) stress the relationship between the typhoid morbidity rate and the concentration of *E. typhosa* found in the sewage of a community. Accordingly, available data have been plotted (fig. 1) in order to give some idea of the relationship between reported isolations and the normal prevalence of typhoid fever in the community. The concentration of *E. typhosa* is expressed as *E. typhosa* per million coliforms, inasmuch

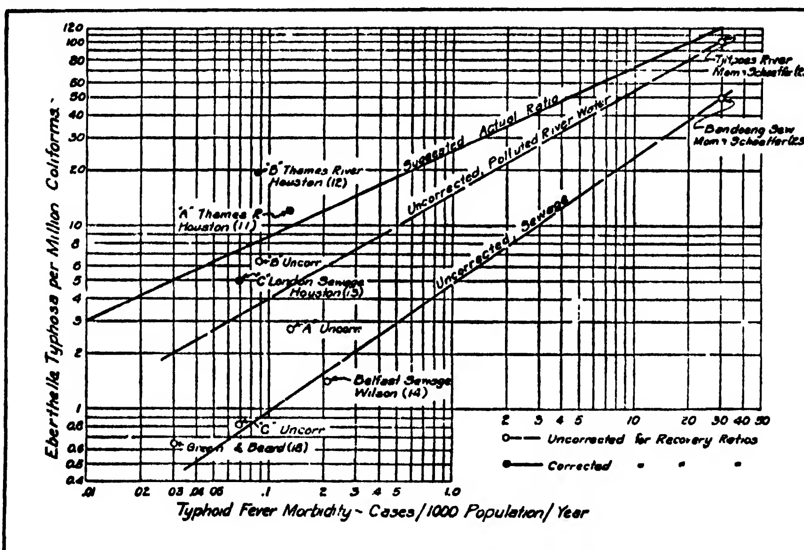


FIGURE 1.—*Eberthella typhosa* per million coliforms for varying typhoid fever morbidity rates.

as this gives an increasing value for increasing prevalence and is convenient to remember, being about the concentration per ml. in a relatively strong raw sewage.

The positions of the lines on figure 1 are rather crude as the data available are insufficient to determine the relationship with any degree of accuracy. The nature of the curve between 0.2 and 30 cases per 1,000 population per year is entirely unknown and the curves are plotted as linear on logarithmic paper without other than convenience for justification. There are also many factors such as individual technique of the investigators, variations in the composition of the Wilson and Blair agar, and the methods of determination and interpretation of the coliform group organisms. All of these factors influ-

[4] The 11 billion coli per ml. of sewage is rather high and may be a misprint in the original article.

ence the results as plotted and it has not been possible to take them into account. The upper line is the suggested ratio, as indicated by the data available, for the absolute numbers of *E. typhosa* in the absence of epidemic conditions, while the two lower lines indicate the ratios which might be expected, uncorrected for recovery losses, in polluted river waters and sewage. The methods used in all cases were direct plating on Wilson and Blair's agar (or some slight modification thereof) except for raw Thames River water where the bacteria were concentrated by precipitation with alum. The ratios given in figure 1 are the approximate minimum ratios to be expected in general in sewage and waters polluted by sewage from large or fairly large populations. These ratios would be increased by carelessness in disposal of infected excreta or the presence of epidemic conditions. In the absence of both cases of typhoid fever and typhoid carriers there would presumably be no *E. typhosa* in the sewage, a condition which may occur in some small towns. Similarly, much greater fluctuations might be expected in the sewage from smaller towns due to the large numbers of *E. typhosa* which a single carrier can excrete and the lack of the balancing effect of large populations.

It is interesting to note that a variety of pathogens have been isolated in examinations of water and sewage by some of the workers previously mentioned. *Salmonella schottmuelleri* (*B. paratyphosus B.*) is perhaps the most frequently mentioned pathogen other than *E. typhosa*. In addition to routine examination and isolation from the sewage and effluent of Epping during the years 1931–1938, the London Metropolitan Water Board Laboratories have reported: One isolation (*4*) from 24 samples of six sewages, mean $\frac{S.\ schottmuelleri}{\text{million coliforms}}=\frac{20}{2.67}=7.5$; 3 isolations (*3*) from 1.825 ml. of 11 different sewages. The 1931 Report of the Chief Medical Officer, British Ministry of Health (*24*), mentions the isolation of *S. schottmuelleri* in 2-ml. amounts from the effluent at Wroxall and in 100-ml. amounts from the River Var 3½ miles below the point of discharge of Wroxall effluent. Gray (*25*) and Begbie and Gibson (*26*) have reported isolation of *S. schottmuelleri* from Edinburgh sewage.

Isolations of *Salmonella typhimurium* (*B. aertrycke*) have been reported by the Metropolitan Water Board (*3, 6*) and in the 1931 Report of the Chief Medical Officer, British Ministry of Health (*24*). The latter also reported the isolation of *Salmonella newport* (*B. newport*) from Ipswich sewage and *Salmonella enteritidis* (*B. enteritidis, Gaertner*) from Daventry sewage.

Most of the isolations reported for organisms other than *E. typhosa* and *S. schottmuelleri* (*B. paratyphosus B.*) were made incidental to the search for *E. typhosa*, and in view of the general lack of knowledge

of percentages of recovery little significance can be attached to the quantitative aspects of these reported isolations other than *E. typhosa* and to some extent *S. schottmuelleri.*

STABILITY OF THE *E. TYPHOSA*—COLIFORM RATIO

The expression of *E. typhosa* concentrations in both sewage and polluted waters as a ratio, such as the *E. typhosa* per million coliforms as used in figure 1, implies the existence of equal logarithmic rates of decrease with time of these organisms under the same environment. There is much to support such an assumption, however, in that many of the factors which combine to form "natural purification rates," such as ingestion by protozoa and sedimentation, would not be expected to differentiate between groups of organisms which do not differ too greatly in essential characteristics such as optimum growth requirements, size, and motility. Perhaps the best evidence of equal rates of decrease yet collected is furnished by the work of the London Metropolitan Water Board in isolations of *Salmonella schottmuelleri* (*B. paratyphosus B.*) from the sewage and effluent at Epping over a period of years. These results, usually 17 samples each of sewage and effluent per year, have been summarized in table 1, which presents the median ratio of $\frac{\text{coli}}{S.\ schottmuelleri}$ found in Epping sewage and effluent. It will be noted that the mean of the median ratios is 1518 for raw sewage as against 1105 for final effluent. This greater ratio in raw sewage is about what one would expect if *S. schottmuelleri* are more difficult to isolate from raw sewage than final effluent. Sir Alexander Houston was able to recover 1/3.1 (*12*) and 1/4.8 (*11*) of *E. typhosa* added to river water, but only 1/10.9 (*13*) of the same organism added to raw London (Barking) sewage.

TABLE 1.—*Ratios of coli/*S. schottmuelleri *in raw sewage and effluent from Epping, England*

Year	Reference	Median coli/ *S. schottmuelleri*		Percent coli reductions	Method of treatment
		Sewage	Effluent		
1931	2	278	[1] 190	96.8	Land treatment.
1932	3	156	[2] >300	85.5	Do.
1933	4	992	250	94.1	Do.
1934	5	714	[2] >300	95.5	Do.
1935	6	5,000	1,500	98.7	Trickling filters.
1936	7	1,000	3,000	98.7	Do.
1937	8	2,000	[2] >300	99.2	Do.
1938	9	2,000	3,000	99.3	Do.
Mean		1,518	1,105	97.0	

[1] Omitting effluent samples prior to May 11 to secure comparable data.
[2] *Salmonella schottmuelleri* not isolated from quantities of effluent containing median numbers of coliforms. Median would be slightly higher if these results were omitted.

Considering the fact that each pair of these samples has undergone identical purification varying between 85.5 and 99.3 percent, such purification being essentially an accelerated natural purification, the net result constitutes the strongest sort of evidence justifying the use of enteric pathogen/coliform ratios for natural purification processes probably up to 99.9 percent reductions from raw or diluted raw sewage. Beyond that percent purification, it seems likely that additional evidence will be required as to relative reductions of pathogens and the coliform group as most curves for coliforms tend to slacken from a straight logarithmic rate of decrease, probably somewhat sooner than the rates of decrease for the more limited number of strains of enteric pathogens.

Additional, though somewhat indirect, supporting evidence for parallel reductions of pathogens and coliforms is presented by Ruchhoft (*27*) and his coworkers in their studies of decrease of coliform group organisms in the Illinois River. The authors conclude, "These results indicate that during self-purification of polluted water there is comparatively little change in the ratio of *Bact. coli* to *Bact. aerogenes.*"

RATES OF DECREASE OF *E. TYPHOSA* AND COLIFORMS UNDER CONDITIONS OF NATURAL PURIFICATION

A large number of investigators have studied the rates of decrease of *E. typhosa* under a variety of conditions. These studies are rarely directly comparable, and frequently were not strictly quantitative. Many of the earlier studies were based on an absence of *E. typhosa* from a qualitative test only, for this organism; the results are therefore of limited value in quantitative studies. Much of the work has been carried on under conditions which were quite surely anaerobic and varied widely from normal, natural purification in streams and quiescent bodies of water.

In figures 2, 3, and 4 are shown data on rates of decrease of *E. typhosa* published by various investigators, compared to values for the rates of decrease of coliforms and 37° agar count organisms as found on the Scioto River (*28*).

The rates of decrease of coliforms in the Scioto River at low stages of the river were found to be about equal in the upper, heavily polluted section of the river and in the lower, less polluted section over concentration ranges that varied by as much as 99.9 percent or more. Observations on the Scioto and the data shown in figures 2, 3, and 4 are divided into three temperature ranges, 9.9° C. and below (fig. 2), 10–19.9° C. (fig. 3), and 20° C. and above (fig. 4), probably averaging, for natural waters, about 5° C., 15° C., and slightly under 25° C., respectively. Very little data are available for figure 2 but Heukelekian and Schulhoff (*20*) presented figures for Raritan River water at

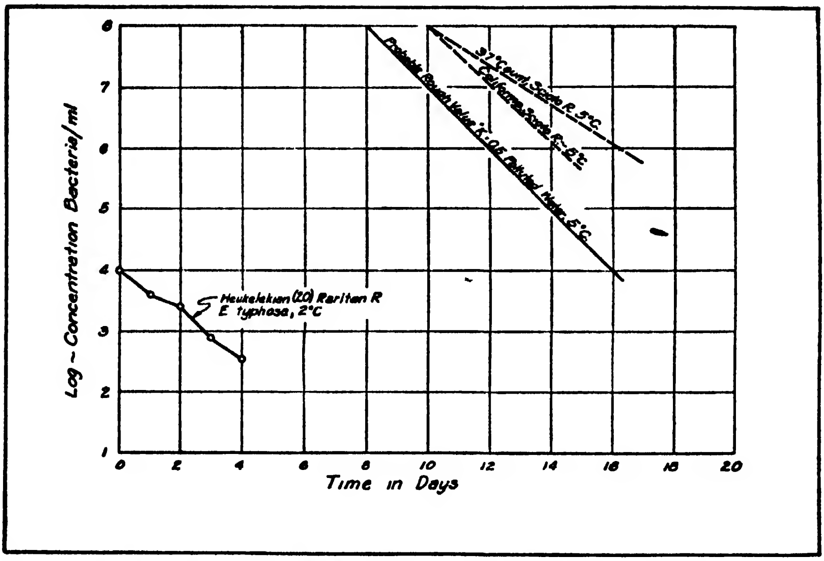


FIGURE 2.—Rates of decrease, *E. typhosa* and coliforms, 9.9°C. and below.

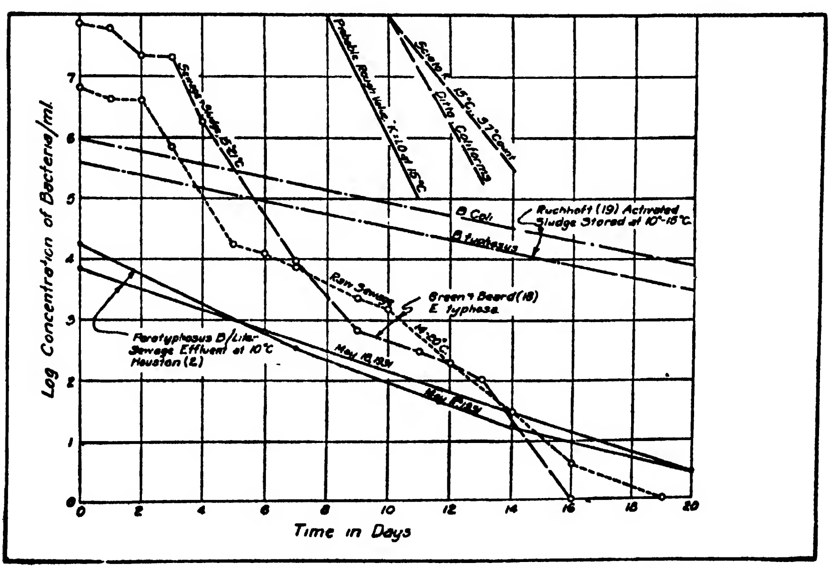


FIGURE 3.—Rates of decrease, *E. typhosa* and coliforms, 10° to 19.9°C.

2° C. which were only slightly lower than comparable rates of coliform decrease in the Scioto River (*28*). If the usual form of monomolecular curve, $y=b10^{-Kt}$, is chosen as representing the logarithmic rate of decrease, where y equals the concentration of bacteria after time, t, in days, b equals the initial concentration, and K a constant dependent largely upon temperature, then the value of K assumed for a temperature of 5° C. for both coliforms and *E. typhosa* as indicated by the data in figure 2 is roughly 0.5.

In figure 3 the available evidence for determination of a K value at 15° C. is rather scattered. The data of Green and Beard (*18*), based on stored sewage and sewage plus sludge at 14°–20° C. and 15°–21° C., respectively, have a K value of about 0.8–1 during an early logarithmic rate of decline, but this decreases to about 0.5 at later stages. Houston's figures (*2*) for *S. schottmuelleri* in sewage effluent at 10° C. show roughly a K value of 0.3 while the figures of Ruchhoft (*19*) show K values of 0.1 for activated sludge stored at 10°–15° C. Ruchhoft's figures also show approximately parallel rates of decline for coliforms. None of these figures are reasonably comparable to conditions in natural waters, being conducted mostly under anaerobic conditions. A K value of 1.0 would seem, therefore, to be about right for the temperature of 15° C., based largely on the Scioto River observations for coliforms, supported by the parallel rates of decrease of coliforms and *E. typhosa* under identical conditions as shown by Ruchhoft.

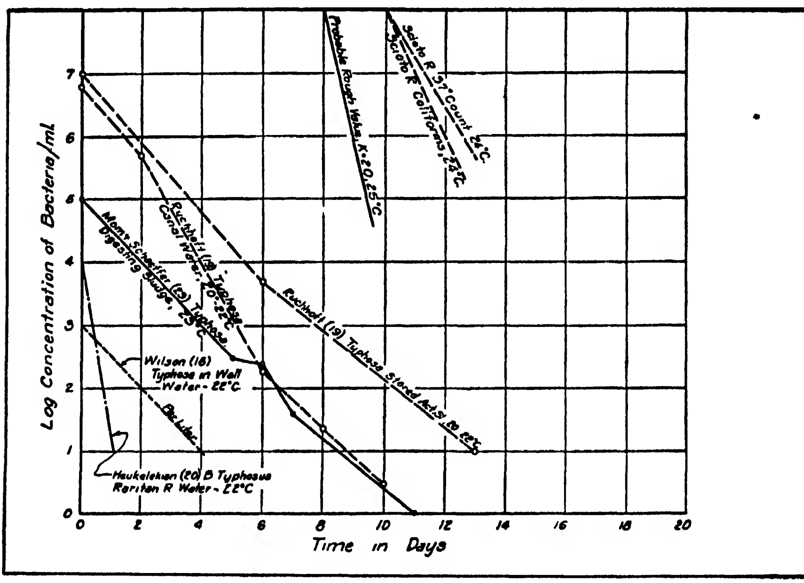


FIGURE 4.—Rates of decrease, *E. typhosa* and coliforms, 20° C. and above.

In figure 4, Heukelekian and Schulhoff (*20*) show K values of about 3.0 for Raritan River water at 22° C., Wilson (*16*) a K value of about 0.5 for well water at 22° C., Mom and Schaeffer (*23*) values of 0.5 for digesting sludge decreasing somewhat after about 99.5 percent drop in *E. typhosa.* Ruchhoft (*19*) gives rates of decrease of slightly under 1.0 for canal water at 20°–22° C. and slightly over 0.5 for stored

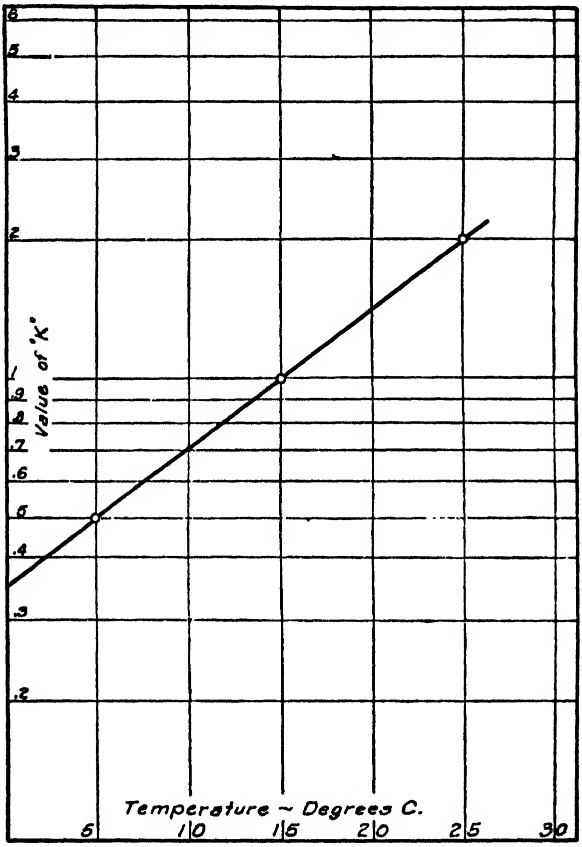


FIGURE 5.—Chart showing variation in value of "K" with temperature in degrees C.

activated sludge at 20°–22° C. A rough K value of 2.0 would probably represent the rate of decrease at 25° C. for both coliforms and *E. typhosa,* due to natural purification processes. The relationship thus obtained between the rates of decrease and temperature is shown, plotted on semi log paper, in figure 5.

If the rates of decrease of coliforms and *E. typhosa* in natural waters are equal for decreases up to 99.9 percent, then a constant typhosa/coliform ratio could be assumed for 1.5 days at 25° C., 3 days at 15° C., and 6 days at 5° C., starting with fresh pollution such as sewage or

dilute sewage and using the values of K derived from the data presented in figures 2, 3, and 4.

The assumption of typhosa/coliform ratios is a logical and rational approach to a more exact and quantitative use of the estimation of coliforms as an indicator of sanitary conditions. This ratio is supported by considerable evidence as presented above and should give additional, if not absolute, legal status to the coliform test which recently received an adverse decision in the courts of Illinois (*1*). This study presents little more than a start on the work needed before such a ratio could have much practical value, inasmuch as the limits of its usefulness should be clearly defined. Some of the factors which should be investigated are: (1) variations to be expected in the ratio in different sewages, (2) the changes, if any, encountered at low coliform concentrations due to high rates of natural or chemical (particularly chlorination) purification, (3) the significance of coliforms from sources other than sewage, and (4) whether, in the presence of coliforms largely from sources other than sewage, isolation of enteric pathogens can be made.

It is believed that the actual determination of the typhosa/coliform ratio and its variations would be worth while in many instances, particularly where a polluted water is used as a source of supply for domestic purposes.

A POSSIBLE THEORETICAL APPLICATION OF THE *E. TYPHOSA*/COLIFORM RATIO

Based on the *E. typhosa*/coliform ratios shown in figure 1, and recorded water-borne outbreaks of typhoid fever, it becomes possible to estimate quite roughly a theoretical minimum infectious dose of *E. typhosa* for the general population and the percentage of persons infected by that dosage.

It is desired to separate epidemics of typhoid fever more or less arbitrarily into two groups according to the presumed intensity of infection and to discuss at length only those of presumably light infectious dosages.

In the category of heavy or uncertain infectious dosages would be included most carrier-borne typhoid, most milk-borne typhoid, and water-borne typhoid with rather heavy attack rates for the population exposed or where the epidemic was traced rather definitely to more or less direct carrier or patient discharge. The assumption of a heavy attack rate accompanying ingestions of large numbers of *E. typhosa* is in accord with general experience in infections and the reverse would also hold true with reservations regarding the size of the minimum infectious dose.

An interesting small outbreak of typhoid fever, with presumably heavy infectious dosages, was reported by Morales and Mandry (*29*).

In this outbreak, 9 of 18 persons regularly using water from a cistern, directly and heavily contaminated by carrier discharges, contracted typhoid fever. Of the nine regular users who escaped, one had had the disease previously and two others had had typhoid immunizations. Wilson (*16*) reports an outbreak at Lisnaskea Infirmary where 23 of 70 patients in the hospital contracted typhoid fever following the admission of a typhoid case to the hospital. This outbreak was apparently water-borne, the wells being subject to pollution by sewage of the institution. Isolations from three samples of well water (following the outbreak) gave estimated densities of 100, 87, and 30 typhoid bacteria per 100 ml.

Although the dividing line between the two chosen classifications of epidemics is not sharp, and no definite distinction can be made in many instances, the second group of outbreaks of typhoid fever might be considered as being due to "diffuse" infection. These epidemics would be characterized by low attack rates for typhoid fever, frequently preceded by widespread occurrence of gastro-intestinal disturbances. Such outbreaks have been so frequently recorded in the United States that one might expect such an outbreak in event of the failure of treatment processes, particularly chlorination, when treating a raw water grossly polluted with sewage. The general pattern of frequently occurring widespread gastro-enteritis, followed by a few cases of typhoid fever, is quite disturbing and the occurrence of such an oubreak in Great Britain at Kiddermaster led Sir George Newman (*30*) to state, "Nevertheless *B. typhosus* is still with us with all its potentialities for evil when conditions are favorable and the vehicle for its transference to the human being is forthcoming and set forth below is a brief account of a water-borne illness from which it is estimated more than 4,000 people in one town (of 29,000 population) suffered. There is strong circumstantial evidence, amounting to proof, that many of these imbibed the typhoid organism but only a very few contracted enteric fever" [9 cases of typhoid fever].

Bearing in mind the frequency of occurrence of this pattern of epidemic, widespread gastro-enteritis followed by a few cases of typhoid fever, and the usual concentrations of *E. typhosa* encountered in sewages and polluted waters as given in figure 1, one is forced to the conclusion that in general it seems unlikely that a single individual would, under such conditions, imbibe more than a single typhoid bacterium or at most only a very few. The theory is advanced, therefore, that a single typhoid bacterium is infective to a small percentage of the general population. An example of the nature of concentrations involved would, at this point, be interesting. Let it be assumed that a water plant is treating water with a typhosa/coliform ratio of 10 per million, corresponding roughly to that found by

Houston in the Thames and in London sewage. If filtered but unchlorinated water were distributed containing 500 coliforms per 100 ml., corresponding to positives for coliforms, in 5 of the 10-ml., 5 of the 1-ml., and 2 of 5 0.1-ml. portions, then the chance of an individual obtaining 1 *E. typhosa* in a daily portion of 1 liter of water would be about 1/20. Two *E. typhosa* from 1 liter of water would presumably be imbibed by 1 in 400 persons and 3 by 1 in 8,000 according to the laws of probability and assuming uniform distribution of bacteria. There would, of course, be little reason to expect that 3 typhosa would be much more infective than a single one. Yet such an occurrence, namely, the passage of 500 coliforms per 100 ml. of drinking water, in the absence of any knowledge concerning the concentration of *E. typhosa*, would, it is believed, give rise to outbreaks of gastro-enteritis followed by a few cases of typhoid fever in the majority of instances.

A question immediately arising is: What percentage of the general population would, on the average, develop a case of typhoid fever from the ingestion of a single *E. typhosa*? The definite answer to this question awaits a quantitatively controlled series of isolations of *E. typhosa* from samples of water supplies taken from the distribution system shortly after polluted water is by-passed or even during the early stages of the gastro-enteritis phase of the outbreak. The methods used by Houston (*11*, *12*) should be adequate if applied to sufficiently large quantities of water. This has probably never been accomplished in diffuse infections although there are records of isolations, following explosive outbreaks involving a high percentage of exposed individuals, such as the previously mentioned work by Wilson (*16*) and the isolations reported in a review of a paper by Klassen (*1*).

In an attempt to obtain an approximate estimate of the number of persons in a population group which might be expected to contract typhoid fever from ingestion of a single typhoid bacterium, according to the theory presented, a study was made of the data presented by Wolman and Gorman (*31*) in their book on water-borne typhoid fever outbreaks during the years 1920–1929. These authors classify outbreaks of water-borne gastro-enteritis and typhoid fever into 7 main groups and 27 subgroups according to the defect responsible for the condition causing the outbreak. Of these 27 subgroups, eliminating such causes as defects in the distribution system, underground supplies, and unknown supplies, the following classifications have been selected as those which would be expected to include largely "diffuse" infections:

A. Surface water supplies
   1. Contamination of brook or stream by pollution on watershed.
   2. Use of polluted river water—untreated.

3. Use of polluted lake water—untreated.
4. Contamination of spring, well, or infiltration gallery by pollution on watershed.
5. Contamination of spring, well, or infiltration gallery by flood waters.

B. Reservoirs or cistern storage
1. Seepage from sewer or surface into cracked cistern or reservoir.

C. Water purification
1. Inadequate control of filtration and allied treatment.
2. Inadequate chlorination—when this is the only treatment.
3. Interruption of chlorination—when this is the only treatment.

A total of 86 epidemics in these classifications was grouped and arranged in the order of increasing percentages of population contracting typhoid fever. A plot of this curve is shown in figure 6. It will be noted that the distribution of the outbreaks on the basis of the percentage of persons contracting the disease is such that for some distance the rise is approximately linear, departing from linearity noticeably when the attack rate is between 1 and 2 percent. If reasonably uniform distributions of concentrations of *E. typhosa* were present in these 86 outbreaks, one would expect a more or less sharp rise in the percentage of persons contracting the disease when exposed to more than a single bacterium. The percentage of persons contracting the disease, following ingestion of a single bacterium, based on the deviation from linearity in figure 6 would seem, therefore, to be in the neighborhood of 1 to 2 percent rather than, for example, 8 percent or more, or even some smaller figure such as 0.5 percent or less. This sort of reasoning is, of course, extremely crude, but it is valuable as a first approximation for estimating the expected cases in specific outbreaks.

Attempts have been made, therefore, to determine whether it is possible to account for certain epidemics by the presence of *E. typhosa* in typhosa/coliform ratios which have been reported in sewage, using 1.5 percent as the attack rate for typhoid fever following ingestion of a single bacterium. In only a few instances has it been possible to get sufficient data on "diffuse" infections to make even a rough estimate of the concentration of *E. typhosa* in the water supply responsible for the epidemic.

Santa Ana, Calif., 1924.—This outbreak was reported by Halliday and Beck (*32*) and as a news item in the Engineering News-Record (*33*). The outbreak involved some 300 cases of typhoid fever and 10,000 cases of gastro-enteritis in two waves. On December 28, 1923, due to a surcharged sewer system following a storm, there was pumped into one of the city reservoirs an estimated 49,000 gallons of 10 percent raw sewage (7 hours at 168,000 gallons per day), which was later pumped into the city mains. Dilution was such that no complaints were received of tastes and odors, thus indicating fairly good mixing

of the sewage and water. Using an estimated coliform content of 200,000 coliforms per ml. for a rather dilute sewage and a typhosa/coliform ratio of 20 per million for the sewage corresponding to an annual morbidity rate of 0.8 per 1,000 population (fig. 1), about 400 *E. typhosa* would be expected in each liter of 10-percent sewage or 74,000,000 typhosa in the 49,000 gallons. Of these about 0.1 percent would presumedly be ingested, or 74,000 *E. typhosa.* If these were uniformly mixed and passed out among the 30,000 population, the average number would be 2.5 per person, making no allowance for a probably rather low rate of natural decrease of *E. typhosa* in the reservoir and distribution system. Inasmuch as about one percent of the popula-

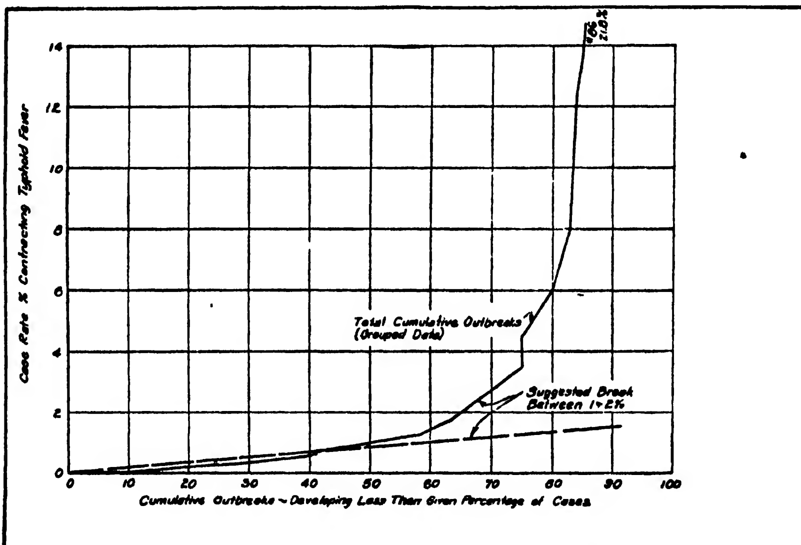


FIGURE 6.—Chart showing break in the linear relationship between cumulative numbers of typhoid fever outbreaks plotted against percentage of cases developing among the general population. Data from Wolman and Gorman (*31*).

tion contracted typhoid fever, it can be seen that the incidence of typhoid fever due to the *E. typhosa* in normal sewage is of the same magnitude as would be expected assuming that 1.5 percent of individuals exposed to a single bacterium would contract the disease. The inaccuracies in the base data must be borne in mind, of course.

Epidemic at Ponce, Puerto Rico (1938).—This epidemic was reported by Lopez (*34*) and involved 198 cases of water-borne typhoid fever in a population of 64,000. Records of the water plant indicate that about three to four of each five 10-ml. portions examined were positive for coliforms during the period July 1 to August 10, inclusive, giving an estimated density of about 10 coliforms per 100 ml. With a consumption of 1 liter per day, the average coliform intake during this 40-day period would be 4,000 per person. Typhoid fever cases had

averaged 50 per year for the preceding 2 years, or about 0.8 cases per 1,000 population, which from figure 1 would indicate an expected 20 *E. typhosa* per million coliforms in the polluted raw water. Using these assumptions, there would be 1 typhoid bacterium to 50,000 coliforms or 1 exposure to each 12.5 persons. If only 1.5 percent of those exposed to a single bacterium contracted the disease, it is necessary to assume a ratio of 1 *E. typhosa* to 20,000 coliforms to account for the reported cases. Such an assumption would, however, be in accord with known conditions, inasmuch as a single carrier can excrete tremendous numbers of typhoid bacteria. Furthermore, the assumption of a higher minimum infectious dose than a single bacterium for typhoid fever would, in this as in many instances, require a tremendous total infection of the water supply. In the particular epidemic under discussion it should be pointed out, however, that a more intense infection of shorter duration might easily have been the cause.

Detroit, Mich., February 1926.—This outbreak, involving 45,000 cases of gastro-enteritis and 8 cases of typhoid fever was reported by Wolman and Gorman (*31*). Data on the coliform content of the treated water were obtained by private communication. In this outbreak, the coliform content of the treated water at the filtration plant was listed as zero for all days of the month of February 1926, except the 25th and the 26th, when the average M. P. N. was 3.0 and 10.0 per 100 ml., respectively. If the mean intake of city water per person is estimated at about 0.5 liter for 2 days (in winter) with a concentration of 6.5 coliforms per 100 ml., and the 1925 mortality rate of 2.7 deaths per 100,000 be multiplied by 10 to get an average morbidity rate of 0.27 cases per 1,000 population, then from figure 1 the expected concentration of *E. typhosa* in the sewage which polluted the raw water and was presumably responsible for the epidemic would be 14 *E. typhosa* per million coliforms. From this the number of persons ingesting a single typhoid bacterium would be $\frac{32.5\times14}{1{,}000{,}000}\times1{,}300{,}000$ population$=$600. If 1.5 percent of those ingesting typhoid bacteria contracted the disease, 9 cases of typhoid fever would have developed, an expectancy only slightly greater and of the same order of magnitude as that which actually occurred.

PRESENT WATER SUPPLY PRACTICE AS RELATED TO THE THEORETICAL MINIMUM INFECTIOUS DOSE OF *E. TYPHOSA*

The question of occasional cases of typhoid fever from water supplies which meet present accepted standards of about 1 coliform per 100 ml. is quite an important problem. It will be remembered, however, that the estimated limit of purification previously considered

for a constant typhosa/coliform ratio was about 99.9 percent purification from sewage or diluted sewage. Most raw waters for surface water supplies have already undergone natural purification of this order of magnitude or greater. To this must be added, from data published by Streeter (*36*, table 5–b), annual average purification plant removal for coliforms which he found to vary from 96.6 to 99.9995 for waters of the Great Lakes. Thus it will be seen that in normal water-plant operation a problem is presented of the fate of typhoid bacteria, relative to that of coliforms, in extremely low concentrations subjected to rather severe conditions.

While there is no widespread typhoid fever due to water supplies which meet present standards, as proved by present low typhoid rates, there is equally no assurance that an occasional case of water-borne typhoid fever does not develop under such conditions.

In fact, if the theory of single bacterium infection is valid, there are undoubtedly occasional cases of typhoid fever due to water supplies which meet approved standards. Such an event would probably only occur under conditions favorable to the passage of the typhoid bacterium and would probably require a high initial typhosa/coliform ratio in the raw water. Suggestions of such an occurrence are indicated by the Minneapolis typhoid fever epidemic of 1935 (*37*). The investigators of this outbreak could find no common source of infection other than water from the Fridley purification plant which had rarely been positive for coliform organisms in 10-ml. portions, although during the period of its presumed infectiveness low chlorine residuals were present and there were considerable numbers of lactose-fermenters which did not confirm as coliforms. The epidemic involved 214 cases scattered over a 3-month period. As part of the investigations following this outbreak, Heathman, Pierce, and Kabler (*38*) studied the comparative resistance of various strains of *E. typhosa* and coliforms to chlorine and chloramine. They found a considerable variation in the resistance of different strains of *E. typhosa* and coliforms and also found that certain freshly isolated strains of *E. typhosa* were more resistant than those which had been grown for some time upon artificial media. It is difficult to accept their implied suggestion of chlorine resistant pathogens in the Minneapolis outbreak, however, in view of their own findings of the variation in resistance of individual strains of both groups of organisms to chlorine and the obviously much larger number of strains of coliforms compared to those of *E. typhosa* which are normally present in sewage polluted waters. The exact effect of chlorine upon the large numbers of strains of the coliform group compared to the effect upon the few strains of *E. typhosa* present is problematical especially after decreases in bacteria have

continued to the range of potable waters. It is believed, however, that this ratio, $\frac{E.\ typhosa}{\text{coliforms}}$, would tend to be decreased in chlorinated waters.

It is interesting to note that Phelps (*39*) in his early experiments on the comparative resistance in aqueous suspension of *B. typhosus* and *B. coli* to calcium hypochlorite concluded that "the slight differences shown by the experiments on the two organisms may be attributed to experimental variations."

The averaged results of 12 sets of observations were as follows:

	Percent removal	
Time:	*B. typhosus*	*B. coli*
20 minutes	90.5	92.0
40 minutes	98.2	98.0
1 hour	99.45	99.53
2 hours	99.60	99.70
4 hours	99.92	99.96
18 hours	99.99+	99.99+

Average available chlorine was 5.0 p. p. m.

Consideration in this report of water-borne outbreaks due to pathogens other than *E. typhosa* has been limited owing to the lack of knowledge of the absolute infectiveness of such pathogens, the concentrations in which they occur, and their rates of decrease under natural conditions.

SUMMARY

A summary has been made of available quantitative data on the relative prevalence of coliforms and *E. typhosa* in sewage and sewage-polluted waters and presented as a ratio of *E. typhosa* per million coliforms at varying levels of typhoid fever morbidity in the community contributing such pollution. Evidence is presented that such a ratio could be expected to remain constant through bacterial reductions, due to natural purification processes approximating 99.9 percent. Data are also summarized regarding rates of decrease of coliforms and *E. typhosa* in three temperature ranges.

A theory is presented that the minimum infectious dose of *E. typhosa* in man is a single bacterium. Based on this theory, and the relative concentration of *E. typhosa* and coliforms usually present in the sewage from large populations, it is estimated that only a small percentage, possibly 1 or 2 percent of persons who ingest a single *E. typhosa*, develops typhoid fever.

The studies made herein of the available data in the literature emphasize the basic value of the coliform test as an indicator of the possible presence of pathogens, and indicate that a very real danger may exist when coliforms, in even moderately high concentrations, are present. The factor of safety provided by the ratio of a million or so coliforms present for each *E. typhosa* would, it is believed, take care of

usual fluctuations in the ratio of *E. typhosa* to coliforms provided the density of coliforms in ingested media be kept quite low or eliminated by methods which reduce the general bacterial population.

REFERENCES

(*1*) High court rejects *B. coli* as indicating unsafe water. Water Works Engineering, **94**: 516 (May 7, 1941).
(*2*) London. Metropolitan Water Board: Twenty-sixth annual report on the results of chemical and bacteriological examination of the London waters for the 12 months ended December 31, 1931.
(*3*) ———— Twenty-seventh annual report on the results of chemical and bacteriological examination of the London waters for the 12 months ended December 31, 1932.
(*4*) ———— Twenty-eighth annual report on the results of chemical and bacteriological examination of the London waters for the 12 months ended December 31, 1933.
(*5*) ———— Twenty-ninth annual report on the results of chemical and bacteriological examination of the London waters for the 12 months ended December 31, 1934.
(*6*) ———— Thirtieth annual report on the results of chemical and bacteriological examination of the London waters for the 12 months ended December 31, 1935.
(*7*) ———— Thirty-first annual report on the results of chemical and bacteriological examination of the London waters for the 12 months ended December 31, 1936.
(*8*) ———— Thirty-second annual report on the results of chemical and bacteriological examination of the London waters for the 12 months ended December 31, 1937.
(*9*) ———— Thirty-third annual report on the results of chemical and bacteriological examination of the London waters for the 12 months ended December 31, 1938.
(*10*) ———— Twenty-second annual report on the results of chemical and bacteriological examination of the London waters for the 12 months ended December 31, 1927.
(*11*) ———— Twenty-third annual report on the results of chemical and bacteriological examination of the London waters for the 12 months ended December 31, 1928.
(*12*) ———— Twenty-fourth annual report on the results of chemical and bacteriological examination of the London waters for the 12 months ended December 31, 1929.
(*13*) ———— Twenty-fifth annual report on the results of chemical and bacteriological examination of the London waters for the 12 months ended December 31, 1930.
(*14*) Wilson, W. J.: Isolation of *B. typhosus* from sewage and shellfish. Brit. Med. J., **1**: 1061 (June 23, 1928).
(*15*) ———— Isolation of enteric bacilli from sewage and water and its bearing on epidemiology. Brit. Med. J., **2**: 560 (Sept. 23, 1933).
(*16*) ———— Isolation of *Bact. typhosum* by means of bismuth sulfite medium in water and milk-borne epidemics. J. Hyg., **38**: 507 (July 1938).
(*17*) Wilson, W. J., and Blair, E. M.: Further experience of the bismuth sulfite media in the isolation of *Bacillus typhosus* and *B. paratyphosus B.* from faeces, sewage, and water. J. Hyg., **31**: 138 (April 1931).
(*18*) Green, C. E., and Beard, P. J.: Survival of *E. typhi* in sewage treatment plant processes. Am. J. Pub. Health, **28**: 762 (June 1938).
(*19*) Ruchhoft, C. C.: Studies on the longevity of *Bacillus typhosus* (*Eberthella typhi*) in sewage sludge. Sewage Works J., **6**: 1054 (November 1934).
(*20*) Heukelekian, H., and Schulhoff, H. B.: Studies on survival of *B. typhosus* in surface waters and sewage. Bulletin No. 589, New Jersey Agric. Exp. Sta., 1935.
(*21*) Stewart, A. D., and Ghosal, S. C.: On the value of Wilson and Blair's bismuth sulfite medium in the isolation of *Bact. typhosum* from river water. Indian J. M. Res., **25**: 591 (January 1938).
(*22*) Hajna, A. A.: Isolating typhoid bacilli in sewage. Municipal Sanitation, **6**: 234 (August 1935).

(23) Mom, C. P., and Schaeffer, C. O.: Typhoid bacteria in sewage and in sludge. Sewage Works J., 12: 715 (July 1940).
(24) Great Britain Ministry of Health: Annual report of the Chief Medical Officer of the Ministry of Health for the year 1931. Page 52.
(25) Gray, J. D. A.: The isolation of *B. paratyphosus B.* from sewage. Brit. Med. J., 1: 142 (1929).
(26) Begbie, R. S., and Gibson, H. J.: Occurrence of typhoid-paratyphoid bacilli in sewage. Brit. Med. J., 2: 55 (1930).
(27) Ruchhoft, C. C., Coulter, E. W., Adams, C. L., and Sotier, A. L.: The disappearance of the coli-aerogenes group in natural purification processes as determined by direct plate counts. J. Bact., 25: 143 (February 1933).
(28) Kehr, R. W., Purdy, W. C., Lackey, J. B., Placak, O. R., and Burns, W. E.: A study of the pollution and natural purification of the Scioto River. Pub. Health Bulletin No. 276, Government Printing Office, 1941.
(29) Garrido-Morales, E., and Costa Mandry, O.: Typhoid fever spread by water from a cistern contaminated by a carrier. J. Prevent. Med., 5: 351 (September 1931).
(30) Great Britain Ministry of Health: Annual report of the Chief Medical Officer of the Ministry of Health for the year 1933. Page 46.
(31) Wolman, A., and Gorman, A. E.: The Significance of Waterborne Typhoid Fever Outbreaks, 1920–1930. Williams & Wilkins, Baltimore, 1931.
(32) Halliday, C. H., and Beck, M. D.: Typhoid fever epidemic, Santa Ana, Calif. J. Prevent. Med., 2: 49 (January 1928).
(33) Serious typhoid epidemic caused by drain-sewer connection. Engineering News-Record, 92: 409 (March 6, 1924).
(34) Lopez, S. R.: A waterborne epidemic of typhoid fever. Puerto Rico Health Bull., 4: 1 (January 1940).
(35) Devendorf, E.: Pollution of the Rochester, N. Y., water supply through cross connections. J. New England Water Works Assoc., 55: 216 (June 1941).
(36) Streeter, H. W.: Studies of the efficiency of water purification processes. IV. Pub. Health Bulletin No. 193, Government Printing Office, 1930.
(37) Minnesota Department of Health: Report of investigations of the typhoid fever epidemic, Minneapolis, 1935.
(38) Heathman, L. S., Pierce, G. O., and Kabler, P.: Resistance of various strains of *E. typhi* and coli aerogenes to chlorine and chloramine. Pub. Health Rep., 51: 1367 (October 2, 1936).
(39) Phelps, E. B.: The disinfection of sewage and sewage filter effluents. U. S. Geological Survey. Water Supply Paper No. 229, Government Printing Office, 1909.

THE TOXICITY OF LEAD AZIDE[1]

By LAWRENCE T. FAIRHALL, *Principal Industrial Toxicologist*, WENDELL V. JENRETTE, *Assistant Physiologist*, STUART W. JONES, *Junior Chemist*, and E. A. PRITCHARD, *Assistant Scientific Aide, United States Public Health Service*

The increased use of lead azide as a detonator in shells and the enormous expansion of the explosives industry in the war effort has stimulated interest among industrial hygienists with reference to possible harmful effects of exposure to lead azide or its intermediates in the process of manufacture. Apparently no investigation of the toxicity of lead azide itself has been made, although some investigation of hydrazoic acid has been reported (*1*).

Lead azide is a white crystalline substance having the formula $PB(N_3)_2$. It is very explosive, decomposes when warmed, and is sensitive to light. When exposed to sunlight it becomes covered with a dark brown film. Lead azide may be prepared by precipitation from an aqueous lead salt solution with hydrazoic acid or by a solution of a

[1] From the Division of Industrial Hygiene, National Institute of Health.

soluble azide. It is prepared commercially by precipitation from a solution of a soluble lead salt such as lead nitrate by the addition of a solution of sodium azide. A small quantity of dextrine is added to the solution in order to control crystal shape. If dextrine is not used, the lead azide crystals are needle-shaped, which not only are very sensitive but do not run freely in the charging machines at the later stages of manufacture (*2*). Sodium azide is prepared by the action of nitrous oxide on sodamide, $NaNH_2$. A basic lead azide can be prepared which is less sensitive to percussion or temperature than lead azide itself. When mixed with 30 percent water, lead azide is said to have the same sensitiveness as the dry material (*3*). According to Riegel (*4*), lead azide is about half as sensitive as mercury fulminate. It is said to have several advantages over mercury fulminate, $Hg(ONC)_2$, however. According to Stuart (*5*), it possesses a very considerably higher ignition point and is completely and permanently stable when exposed to temperatures of about 50° C. According to the same authority it is unaffected by other metals, shows a great superiority as an initiator of detonation, retains its brisance unimpaired under heavy pressure, and does not exhibit the phenomenon of becoming "dead pressed."

Hydrazoic acid, or azoimide, HN_3, in aqueous solution behaves as a strong acid dissolving such metals as zinc, iron, or magnesium with the evolution of hydrogen and the formation of the corresponding metallic salt. The acid solution has a penetrating, unpleasant odor, causes headache and eye irritation, and consequently requires care in handling.

Lead azide is coarsely crystalline in form and, owing to its explosive character, dust arising from it is kept to a minimum in industry. Exposure to the substance by inhalation in industry is consequently negligible. However, the possibility of inhalation of a certain amount of azoimide vapor occurs in the preparation of the lead compound and furthermore there is the possibility of other exposure to either the lead salt or more soluble azides in the course of preparation. For these reasons it is advisable to define more clearly the toxic factors associated with the industrial production of lead azide.

METALLIC AZIDES

Experiments were arranged in which three groups of ten white rats each received, by mouth, approximately 60 mg., 40 mg., or 20 mg. of lead azide per rat per day. A similar group of rats received 60 mg. of lead as lead carbonate per day. Finally two groups of rats of the same age as the preceding animals received the same basic diet and served as controls.

The deaths occurring in these various groups of lead azide rats were proportional to the amount of lead salt received, i. e., 100 percent of the rats given 60 mg. died within 9 weeks, 100 percent of the animals given 40 mg. died within 14 weeks, and 60 percent of the animals given 20 mg. were dead within 44 weeks. However, only 20 percent of the group of rats given lead carbonate were dead at the end of 44 weeks while 30 percent of the control animals had died within this period (fig. 1). The physical appearance and early death of those animals receiving the larger amounts of lead azide attested to the toxicity of the salt.

On the basis of this experiment alone it would appear that the

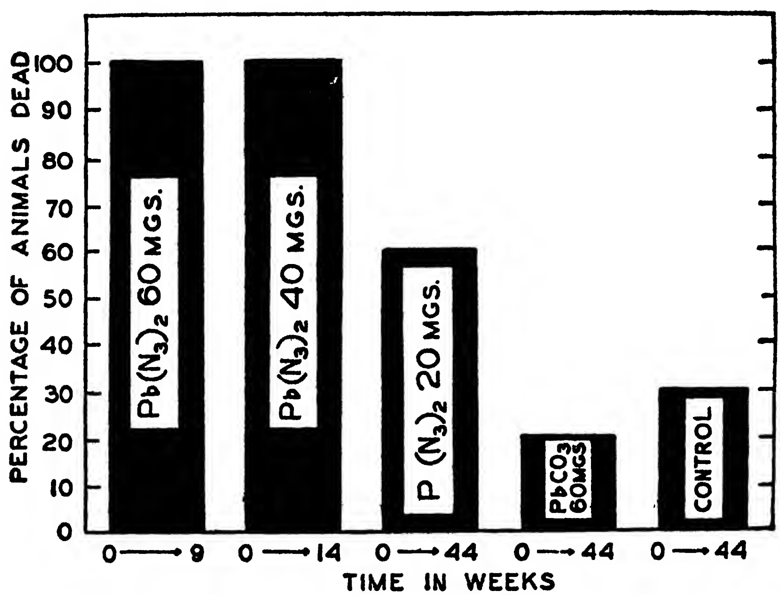


FIGURE 1.—The lethal action of ingested lead azide.

azoimide group rather than the lead is the more toxic molecular constituent.

The amounts of lead stored in the tissue of the rats of the various groups are indicated in table 1. It is apparent from these data that while lead was stored in all cases, no relation exists between storage at various levels of lead azide intake so far as this investigation is concerned. Those animals which received less lead azide per day lived longer and therefore eventually received a total amount of lead similar to or in excess of that received by the heavy dosage group. Therefore it was not surprising that the total amount stored was equal to or in excess of that stored by the animals which received the heavier dosage.

The concentration of lead in the livers of the animals receiving the higher dosage of lead azide was greater (0.266 mg./10 g. of liver) than is usual with lead-poisoned animals, but no striking differences were noted in the lead content of the kidney. The lead content of the bone

TABLE 1.—*The distribution of lead in the tissues of rats following the ingestion of lead azide*

Type of experiment	Average initial weight in grams	Average weight at death in grams	Percent mortality at end of 300 days	Average lead content of tissues mg. Pb/10 grams tissue		
				Liver	Kidney	Bone
Lead azide 20 mg./day	217	183	60	0.023	0.287	7.09
Lead azide 40 mg./day	295	150	100	.191	.480	4.87
Lead azide 60 mg./day	203	188	100	.266	.441	5.20
Lead carbonate 60 mg./day	158	213	20	.062	.498	11.28
Control I	236	211	30	.001	.001	.000
Control II	224	240	30	.001	.001	.001

was highest (11.28 mg/10 g. bone) in that group of animals which received 60 mg. of lead as carbonate for 10 months, and next highest (7.09 mg./10 g. bone) in the 20 mg./day lead azide group (fig. 1).

The amount of lead stored was therefore somewhat proportional to the total amount received and is not an index of toxicity. The earlier deaths of the animals receiving large doses of lead azide, on the other hand, indicate a toxicity inherent in that salt. As the preceding experiment indicated that the toxicity associated with lead azide was chiefly due to the azoimide anion, further study was made of hydrazoic acid and its corresponding sodium salt.

Sodium azide was added to the diet of a group of nine rats in an amount (26.7 mg. of sodium azide daily) equivalent to that fed the rats given 60 mg. of lead azide. The degree of mortality following the oral administration of this salt is shown in table 2.

TABLE 2.—*Effect of feeding sodium azide to nine rats equivalent in amount (26.7 mg.) to that of the rats fed 60 mg. lead azide*

Number of rats surviving	Average weight of rats in grams	Number of days on test	Percent mortality	Number of rats surviving	Average weight of rats in grams	Number of days on test	Percent mortality
9	224	0	0	5	170	26	44
9	207	7	0	4	168	30	55
9	193	14	0	3	165	33	67
8	185	17	11	2	159	38	78
7	181	20	22	1	151	39	88
6	174	25	33		150	39	100

It is evident from the above data that sodium azide is more acutely toxic than lead azide. The animals given sodium azide showed a 100 percent mortality in 39 days while the corresponding animals given lead azide attained 100 percent mortality only within 55 days. Furthermore, a more pronounced drop in weight occurred with the

rats fed sodium azide. From an initial average weight of 224 gm. the weight dropped consistently to 150 gm. With the rats fed lead azide, on the other hand, the weight dropped from an initial value of 203 gm. to only 188 gm. It is apparent that the sodium salt is more rapidly fatal than the lead azide.

Further experiments with sodium azide in comparison with lead azide confirmed this finding. The intraperitoneal injection, subcutaneous injection, and oral administration of sodium azide and of lead azide indicated that weight for weight the former was the more toxic.

Some difficulty was encountered in securing and measuring the suspension of lead azide for injection owing to the rate at which it settled from suspension. However, sufficient data were secured to indicate that no more than 150 mg. per kg. of body weight could be injected intraperitoneally into rats without causing death. This would correspond to 33 mg. of sodium azide. In table 3 the physiological effect is indicated by various methods of administering sodium azide to rats in varying concentrations. The minimum lethal dose represented by the amount which caused 75 percent of the animals to die in 3 hours following injection lies between 35 and 38 mg.

TABLE 3.—*The effect of injecting sodium azide intraperitoneally and subcutaneously and the effect of oral administration of sodium azide in rats*

Number of rats	Dose in mg. per kg. of body weight	Equivalent of hydrazoic acid in mg.	Died in 3 hours	Percent dead in 3 hours
Intraperitoneal injection:				
4	25	16 5	0	0
11	30	19 8	1	10
12	33	21 8	8	66
15	35	23 1	10	66
5	36	23.8	4	80
5	37	24.4	5	100
Subcutaneous injection:				
5	33	21 8	0	0
9	35	23.1	4	45
8	38	25.1	8	100
Oral administration:				
3	40	26 4	0	0
2	42	27.8	1	50
2	44	29 1	1	50
8	45	29 8	5	62
3	46	30 4	3	100
3	48	31 7	3	100
3	60	39.7	3	100

The acute toxicity associated with lead azide and with sodium azide therefore should be evaluated in terms of their azoimide content.

Patch tests were made on 10 individuals with a 10-day interval between applications. No reaction whatsoever was observed in any case from either of these applications. Schwartz (*6*) has never found dermatitis from lead azide in industry.

HYDRAZOIC ACID

Although hydrazoic acid was prepared in several ways, a method based on Thiele's reaction was found to be especially useful. In this procedure 16.5 percent phosphoric acid solution was distilled with hydrazine sulfate and sodium nitrite. When smaller quantities were desired, hydrazoic acid was prepared by acidifying a solution of sodium azide, extracting the hydrazoic acid with ether, and evaporating the ether layer over distilled water. Where exposure to azoimide gas was desired, air was bubbled through an aqueous solution of acid displacing the azoimide.

Hydrazoic acid has a sickly penetrating odor and produces unpleasant after-effects when inhaled. The most marked effect noticeable is the eye irritation and severe headache following inhalation in low concentrations; in greater concentrations it causes death. The pure acid is a colorless liquid boiling at 37° C. and readily soluble in water or alcohol.

Since the pure acid is only of academic interest in the present instance, the properties of its solution in water are more pertinent to the present study. The aqueous solution smells strongly of azoimide. It precipitates azides from a number of metallic salt solutions and readily dissolves zinc, iron, magnesium, and aluminum with evolution of hydrogen and formation of the corresponding azide. The red color which hydrazoic acid gives with ferric salts was used as a means of evaluating concentrations of the acid where titration or gravimetric methods were inadequate.

A dilute aqueous solution of hydrazoic acid having a concentration of 1 percent was used in the following experiments. When added to a dilute solution of silver nitrate a white precipitate of silver azide formed which readily detonated when dry. Although dilute, the solution of hydrazoic acid smelled strongly and azoimide was readily given off when air was bubbled through the solution.

The hydrazoic acid for this purpose was prepared by acidifying an aqueous solution of sodium azide with sulfuric acid, extracting with ether, and evaporating the ethereal extract until only a trace of ether remained. The resulting aqueous solution of hydrazoic acid was diluted to various concentrations for use in the animal exposure experiments. The percentage composition of these various dilutions was determined by titration.

In order to determine whether toxic material was evolved from the aqueous solution of hydrazoic acid, air was bubbled into the solution, and animals exposed to this vapor.

Mice, rats, and guinea pigs were used as experimental animals. The results thus obtained are given in table 4.

TABLE 4.—*Effect of exposure of animals to vapor from various concentrations of hydrazoic acid solution*

Kind of animal	Number used	Volume of hydrazoic acid used (ml.)	Strength of hydrazoic acid solution—percent of HN_3 by weight	Time of lethal exposure in minutes
Mice	3	10	0 6	6
	3	10	.73	5
	3	5	.73	6
Rats	1	10	.6	28
	1	10	.6	31
	1	30	.6	7
	1	20	1 2	4
Guinea pigs	1	53	.6	80
	1	20	1 2	22

It is clearly evident from these results that azoimide can be readily displaced from aqueous solution by passing air through it and also that the azoimide vapor is decidedly toxic. Inhalation of the vapor caused a marked physiological response. This was noted after only a few moments of exposure. A degree of excitability was apparent first of all, followed by dyspnea, paralysis of the hind legs, convulsions, convulsive breathing, and finally death.

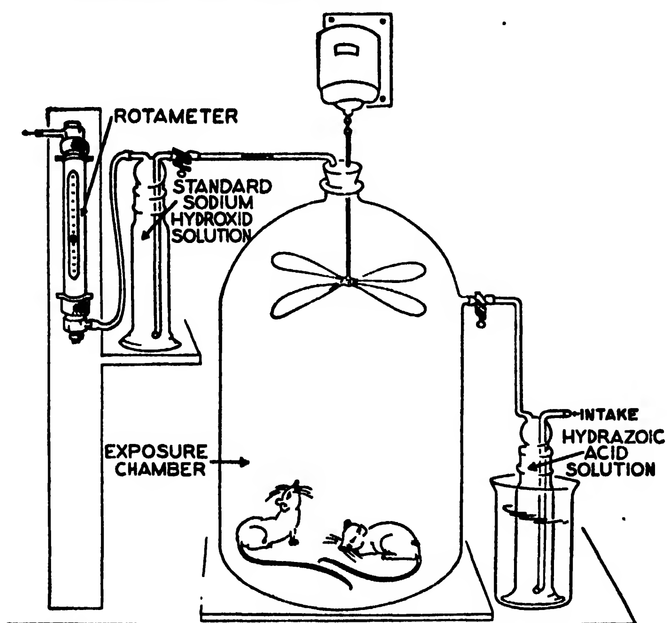


FIGURE 2.—Apparatus for exposing animals to known concentrations of azoimide.

Since an aqueous hydrazoic acid solution was found to give off hydrazoic acid gas in sufficient amount to prove fatal to animals, further experiments were made to determine the toxicity of azoimide gas at various concentrations. For this purpose the apparatus

shown in figure 2 was used. This consisted of a 33 liter bell jar having tubulature on the side two-thirds of the distance to the top. The animals to be exposed were placed upon a square glass plate, the bell jar lowered over them and made air tight at this junction with lubriseal. A fan served to mix the incoming gas rapidly and to maintain a uniform mixture of gases. Air drawn into the apparatus first passed through an aqueous solution of hydrazoic acid maintained at constant temperature in a water bath at 50° C. It then passed into the bell jar and any excess on leaving the bell jar was absorbed in a measured amount of standard sodium hydroxide solution in an absorption flask. The volume of air drawn into the apparatus was measured by means of a rotameter. A measured volume of hydrazoic acid, the concentration of which had been previously determined by titration, was placed in the bubbler and air passed through it until the concentration of gas in the bell jar was sufficiently high. The pinch clamps were then closed and the animals exposed to the given gas concentration for 1 hour. The air was kept in motion by the fan during the entire exposure. Both the solution in the hydrazoic acid bubbler and the sodium hydroxide solution of the absorption apparatus were titrated at the conclusion of the experiment. These various data enabled one to calculate the atmospheric gas content of azoimide in the bell jar. The animals were thus exposed to a known concentration of hydrazoic acid and observed for a period of 3 hours thereafter. A degree of excitability was apparent first of all, followed by dyspnea with flank breathing, lachrymation, salivation, and loss of muscular coordination of the extremities. These phenomena were followed by clonic convulsion, then tonic convulsion and death.

The data indicating the effect on animals following exposure to hydrazoic acid gas of various concentrations are given in table 5.

TABLE 5.—*Physiological response to various concentrations of hydrazoic acid gas (azoimide)*

Number of rats	Weight of rats in grams	Parts of azoimide per million parts of air	Number of deaths following 1 hour of exposure	Average percent mortality
2	245, 215	849	0	
2	180, 230	853	0	
2	240, 190	853	0	
2	205, 180	853	0	[illegible]
2	210, 185	910	0	
2	215, 190	910	0	
2	180, 205	967	0	
2	210, 245	1,024	1	[illegible]
2	240, 235	1,024	2	

Table 5.—*Physiological response to various concentrations of hydrazoic acid gas (azoimide)*—Continued

Number of rats	Weight of rats in grams	Parts of azoimide per million parts of air	Number of deaths following 1 hour of exposure	Average percent mortality
2	218 205	1,024	0	37
2	180 185	1,024	0	
2	160 240	1,081	1	75
2	208 185	1,081	2	
2	260 225	1,138	2	94
2	270 265	1,138	2	
2	230 280	1,138	2	
2	225 200	1,138	2	
2	225 215	1,138	1	
2	188 185	1,138	2	
2	215 190	1,138	2	
2	170 220	1,138	2	
2	220 235	1,162	2	100
2	195 220	1,194	2	100
2	210 235	1,194	2	
2	185 200	1,251	2	100
2	245 210	1 308	2	100
2	230 205	1,308	2	
2	225 240	1,365	2	100
2	188 200	1,365	2	

These experiments indicate that a relatively sharply defined and consistent relationship exists between concentration and lethal action. Up to about 900 p. p. m., azoimide is not lethal when breathed by rats and guinea pigs for 1 hour. At a concentration beyond this point, however, its lethal effect is notable, and beyond about 1,160 p. p. m. its lethal action is invariable when it is breathed for 1 hour. It is invariably fatal in exposures of one-half to three-quarters of an hour to concentrations of about 1,300 p. p. m. When these values are plotted (fig. 3) the resulting graph tends to follow the sigmoid form characteristic for response of this type. On inspection of this curve it is apparent that a definitely pronounced effect becomes apparent above 1,100 p. p. m.

In comparison with certain other toxic gases it would appear that hydrazoic acid is lethal in concentrations approaching those of hydrogen sulfide or hydrogen cyanide, although its action is not so marked at low concentrations. On the other hand, the response with hydrazoic acid is sharply defined in the upper range of concentration (table 6).

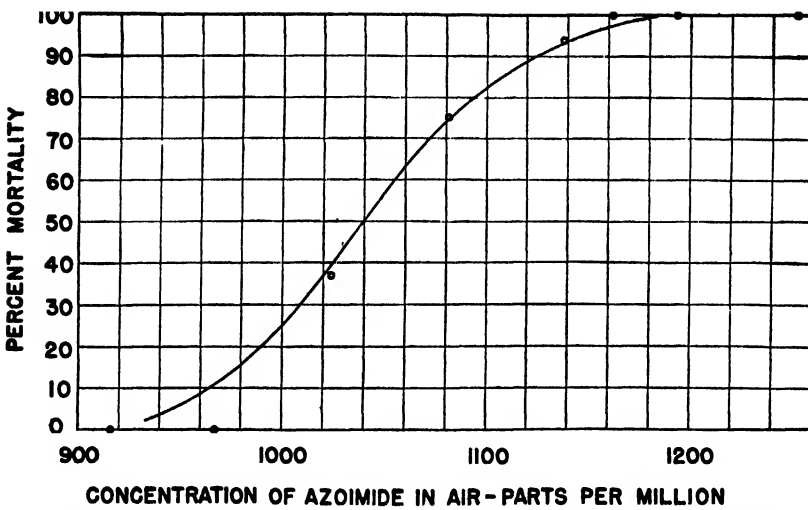


FIGURE 3.—The lethal action of azoimide at various concentrations following 1 hour of exposure.

TABLE 6.—*The physiological response of rats to azoimide of various concentrations in comparison with that of other noxious gases (7)*

Effect on the rat	Hydrazoic acid (p. p. m.)	Hydrogen sulfide (p. p. m.)	Hydrogen cyanide (p. p. m.)	Carbon monoxide (p. p. m.)
Not lethal when breathed for 1 hour	0–900			
Dangerous when inhaled for 1 hour	900-1,100			
Fatal when breathed for 1½ hours			[1] 110 (a)	
First appearance of poisoning		150 (b)		
Fatal concentration at room temperature				1,200 (c)
Assumes prone position after exposure of 9½ minutes			127 (d)	
Assumes prone position after exposure of 5 minutes			204 (e)	
Concentrations which are invariably fatal after exposure of 1 hour	1,100 1,300			
Concentration fatal in less than 1 hour	1,300			
Recovery only if immediately removed following loss of consciousness		1,500 (f)		
Concentration fatal following exposure of 10 minutes	2,900			

[1] Letters after figures refer to reference (7).

In another experiment eight rats, in pairs, were exposed to higher concentrations and the time in minutes found necessary to kill each pair was noted. These values are given in table 7.

TABLE 7.—*Time of death following exposure of rats to high concentrations of azoimide*

Weight of rats in grams	Concentration of azoimide (p.p.m.)	Time of death in minutes	Weight of rats in grams	Concentration of azoimide (p.p.m.)	Time of death in minutes
180 200	1,566	30	235 200	2,080	16
205 230	1,872	19	200 185	2,900	10

The results obtained in this experiment show that these high concentrations are not only invariably fatal but that a concentration of the magnitude of 2,900 p.p.m. causes death when inhaled for as short a period as 10 minutes. This definitely places hydrazoic acid in the group of dangerous gases.

SUMMARY

An investigation of lead azide as an industrial hazard has indicated that the storage and distribution of lead in the tissues following the ingestion o this compound are in general similar to that of other lead salts. The acute toxic effect of this substance, however, is associated with the azoimide radical rather than with the lead.

Further evidence confirming this was obtained from observations of the effect of administering sodium azide intraperitoneally, subcutaneously, and orally in comparison with similar experiments with lead azide. The minimum lethal dose of sodium azide following injection lies between 35 and 38 mg. per kg. of body weight, while up to 150 mg. per kg. of body weight of lead azide could be injected intraperitoneally without causing death. This is equivalent in amount to 66 mg. of sodium azide.

The effect of exposure to hydrazoic acid gas by inhalation was determined at various concentrations and it has been shown to be invariably fatal to rats in amounts beyond 1160 p. p. m. when breathed for 1 hour. The results of this investigation indicate clearly that hydrazoic acid should be considered a dangerous gas.

REFERENCES

(*1*) Smith, Letchworth, and Wolf, C. G. L.: The physiological action of azoimide. J. Med. Res., **12**: 451–474 (1904).
(*2*) Hill, S. G.: Commercial detonators. Manufacture of lead styphnate and lead azide. Can. Chem. and Proc. Ind., **26**: 1 (1942).
(*3*) Mellor, J W.: Comprehensive Treatise on Inorganic and Theoretical Chemistry. Vol. 8, p. 354. Longmans, Green, and Co., New York, 1928.
(*4*) Riegel, E. R.: Industrial Chemistry. 3d ed., p. 577. Reinhold, New York, 1937.
(*5*) Stuart, A. J.: Lead hydronitride. U. S. Artillery, **41**: 212 (1914).
(*6*) Schwartz, Louis: Industrial dermatitis. Indust. Med., **11**: 457–462 (1942).
(*7*) Flury, F., and Zernik, F.: Schädliche Gase, Dampfe, Nebel, Rauch-und Staubarten. J. Springer, Berlin, 1931. (*a*) p. 402; (*b*) p. 134; (*c*) p. 204; (*d*) p. 403; (*e*) p. 403; (*f*) p. 134.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 3, 1943

Summary

No significant change in health conditions in the United States is indicated by the reports of the important communicable diseases for the current week. With the exception of meningococcus meningitis and measles, the incidence of the 9 common communicable diseases included in the following tables is below or only slightly above the respective 5-year (1938–42) medians. A total of 26,183 cases of measles was reported, as compared with a median of 21,924.

A total of 595 cases of meningoccocus meningitis was reported, as compared with 572 for the preceding week and 614 for the next earlier week. As compared with the average numbers of cases reported in the past 3 weeks, increases are shown in the Middle Atlantic, East North Central, East South Central, and Pacific States. In the South Atlantic States a total of 106 cases was reported, as compared with 95 for the preceding week and a 3-week average of 120. Annual case rates per 100,000 estimated population for the first 13 weeks of the year, by geographic divisions, are as follows: New England, 34.2; Middle Atlantic, 17.8; East North Central, 7.6; West North Central, 10.9; South Atlantic, 26.0; East South Central, 19.4; West South Central, 10.9; Mountain, 17.4; and Pacific, 29.4. The rate for the United States is 17.5, as compared with 2.1 for the median of the past 5 years.

States reporting the largest numbers currently (preceding week's figures in parentheses) are as follows: New York, 68 (51); California, 58 (43); Mississippi, 43 (23); New Jersey, 39 (38); Pennsylvania, 38 (44); Virginia, 31 (33); Massachusetts, 23 (30); Maryland, 22 (17); Illinois, 21 (14); Kentucky, 20 (13); and Texas, 20 (20).

The total number of deaths recorded for the week in 89 large cities of the United States was 9,812, as compared with 9,858 for the preceding week and a 3-year average of 8,810. The cumulative figure for the first 13 weeks of the year is 130,970, as compared with 119,905 in the same period of last year.

Telegraphic morbidity reports from State health officers for the week ended April 3, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	Apr. 3, 1943	Apr. 4, 1942		Apr. 3, 1943	Apr. 4, 1942		Apr. 3, 1943	Apr. 4, 1942		Apr. 3, 1942	Apr. 4, 1942	
NEW ENG.												
Maine	0	1	1	------	------	4	8	173	164	8	4	1
New Hampshire	0	0	0	5	6	------	60	8	46	1	0	0
Vermont	0	0	0	------	------	------	470	70	43	1	0	0
Massachusetts	3	5	2	------	------	------	1,665	1,085	787	23	7	2
Rhode Island	1	0	0	1	------	------	11	267	9	17	0	0
Connecticut	1	1	1	5	------	6	455	365	134	9	2	1
MID. ATL.												
New York	17	29	22	[1] 19	[1] 15	[1] 15	2,826	622	1,467	68	30	4
New Jersey	6	8	6	9	4	11	1,653	379	461	39	5	1
Pennsylvania	7	11	25	5	------	------	2,394	1,081	1,081	38	5	5
E. NO. CEN.												
Ohio	13	9	9	7	23	16	1,227	354	354	7	1	2
Indiana	3	6	6	44	23	27	761	125	125	9	0	1
Illinois	22	8	34	11	23	33	1,378	527	527	21	1	1
Michigan [2]	5	2	11	4	2	3	1,301	202	393	18	2	1
Wisconsin	1	4	0	36	55	202	1,563	870	870	12	1	1
W. NO. CEN.												
Minnesota	3	0	1	------	------	3	126	693	214	4	1	0
Iowa	5	1	3	------	5	14	341	267	267	2	0	0
Missouri	4	4	4	8	1	9	369	157	146	12	0	0
North Dakota	0	0	1	3	------	5	56	64	44	0	0	0
South Dakota	10	0	1	------	------	1	178	6	6	0	0	0
Nebraska	0	5	4	29	55	------	196	190	80	0	0	0
Kansas	7	1	4	3	12	12	629	646	580	4	2	1
SO. ATL.												
Delaware	0	0	0	------	------	------	95	3	3	2	0	0
Maryland [2]	16	1	3	8	5	41	140	780	393	22	5	1
Dist. of Col.	0	1	2	1	3	2	75	91	91	5	2	0
Virginia	3	3	14	556	311	441	621	217	421	31	3	1
West Virginia	1	6	9	119	22	36	90	209	209	4	3	3
North Carolina	8	8	12	71	26	37	93	1,090	1,090	18	2	1
South Carolina	3	7	5	478	605	605	175	347	347	15	2	1
Georgia	4	5	7	48	45	90	264	263	263	7	4	2
Florida	2	4	6	5	1	13	69	260	260	2	1	1
E. SO. CEN.												
Kentucky	3	7	7	7	9	30	543	111	111	20	4	4
Tennessee	3	2	6	74	44	153	540	129	129	18	1	2
Alabama	7	8	8	324	328	328	320	257	257	9	0	3
Mississippi [2]	2	7	6	------	------	------	------	------	------	43	1	1
W. SO. CEN.												
Arkansas	4	2	6	62	201	201	157	320	320	1	0	0
Louisiana	3	3	7	8	3	11	240	292	69	7	0	1
Oklahoma	1	4	7	78	141	197	107	255	111	1	0	1
Texas	29	30	26	1,129	1,113	1,154	1,297	2,139	789	20	7	2
MOUNTAIN												
Montana	2	0	0	52	5	10	374	150	44	0	0	0
Idaho	0	1	1	------	------	------	27	60	39	0	0	0
Wyoming	1	0	1	26	104	1	213	77	77	1	0	0
Colorado	14	6	7	31	49	30	720	254	272	4	1	0
New Mexico	0	0	2	------	3	3	12	133	110	0	0	0
Arizona	1	0	2	98	151	137	31	206	104	0	0	0
Utah [2]	0	0	0	9	7	13	252	235	235	1	0	0
Nevada	0	0	------	3	------	------	21	9	------	0	0	------
PACIFIC												
Washington	7	0	1	2	1	1	775	286	286	6	3	1
Oregon	1	2	2	22	24	28	453	130	130	7	1	1
California	19	17	17	70	220	220	812	5,470	686	58	9	2
Total	242	223	311	3,465	3,645	4,087	26,183	21,924	21,924	595	110	57
13 weeks	3,679	4,037	4,942	57,434	61,452	113,646	210,408	204,951	204,951	5,826	952	682

See *footnotes* at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 3, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	Apr. 3, 1943	Apr. 4, 1942		Apr. 3, 1943	Apr. 4, 1942		Apr. 3, 1943	Apr. 4, 1942		Apr. 3, 1943	Apr. 4, 1942	
NEW ENG.												
Maine	0	0	0	13	13	13	0	0	0	1	0	0
New Hampshire	0	0	0	10	14	7	0	0	0	0	0	0
Vermont	0	0	0	10	11	15	0	0	0	0	0	0
Massachusetts	0	0	0	568	363	171	0	0	0	2	2	0
Rhode Island	0	0	0	17	19	17	0	0	0	0	1	0
Connecticut	0	0	0	93	30	86	0	0	0	0	0	0
MID. ATL.												
New York	0	2	1	559	498	748	0	0	0	4	6	6
New Jersey	0	0	0	204	117	181	0	0	0	1	1	1
Pennsylvania	2	0	0	350	494	461	0	0	0	0	1	7
E. NO. CEN.												
Ohio	0	2	1	314	414	414	1	0	3	2	0	2
Indiana	2	0	0	154	125	190	2	0	5	0	0	1
Illinois	0	0	1	271	238	512	1	1	7	6	1	3
Michigan [2]	0	1	1	119	219	396	0	0	0	3	0	2
Wisconsin	0	0	0	339	175	175	0	0	4	0	2	0
W. NO. CEN.												
Minnesota	0	0	0	33	89	89	0	0	3	1	0	0
Iowa	0	0	0	59	55	75	1	2	23	0	0	0
Missouri	0	0	0	80	37	40	0	3	17	1	0	1
North Dakota	0	0	0	5	21	15	0	0	3	0	0	0
South Dakota	0	0	0	11	42	13	0	0	1	0	0	0
Nebraska	0	0	0	29	60	44	0	0	0	0	0	0
Kansas	0	0	0	74	105	105	1	0	1	0	0	0
SO. ATL.												
Delaware	0	0	0	9	25	11	0	0	0	0	0	0
Maryland [2]	0	0	0	146	79	49	0	0	0	5	2	2
Dist. of Col.	1	0	0	20	8	16	0	0	0	0	1	0
Virginia	0	0	0	43	18	32	0	0	0	2	0	3
West Virginia	0	0	0	21	39	42	0	0	0	0	4	4
North Carolina	0	0	0	32	27	32	0	0	0	0	1	2
South Carolina	0	1	0	5	2	4	1	0	0	1	6	3
Georgia	0	0	0	15	9	13	9	0	0	1	2	2
Florida	0	0	1	7	8	8	0	0	0	1	2	4
E. SO. CEN.												
Kentucky	3	0	0	51	71	96	0	0	0	0	1	2
Tennessee	0	0	0	45	48	67	0	5	3	3	2	2
Alabama	0	0	0	43	11	11	0	1	1	2	1	3
Mississippi [2]	1	2	2	10	9	7	1	0	0	1	3	2
W. SO. CEN.												
Arkansas	0	0	0	5	5	5	1	2	2	1	0	1
Louisiana	0	0	0	13	4	7	0	2	1	2	5	6
Oklahoma	0	0	0	17	15	18	0	1	3	1	2	1
Texas	0	0	0	162	60	60	13	18	18	3	7	5
MOUNTAIN												
Montana	0	1	1	16	32	29	0	0	0	0	0	0
Idaho	0	0	0	7	2	8	0	0	0	0	0	0
Wyoming	0	0	0	58	19	17	0	0	0	0	0	0
Colorado	0	1	0	39	37	37	0	0	7	0	1	0
New Mexico	0	0	0	3	4	11	0	0	0	4	1	1
Arizona	[3] 4	0	0	19	4	5	0	0	0	0	1	1
Utah [2]	1	0	0	49	24	23	0	0	0	0	0	0
Nevada	0	0	------	1	2	------	0	0	------	0	0	------
PACIFIC												
Washington	1	0	0	40	24	24	0	0	1	4	0	0
Oregon	0	0	0	12	12	18	0	1	1	1	0	0
California	5	0	0	136	92	149	0	0	2	1	3	4
Total	[3] 20	10	19	4,336	3,829	5,064	31	36	72	54	59	86
13 weeks	340	300	300	51,038	52,173	61,523	350	302	954	692	966	1,002

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 3, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Whooping cough: Week ended—Apr. 3, 1943	Whooping cough: Week ended—Apr. 4, 1942	Whooping cough: Median 1938–42	Week ended Apr. 3, 1943: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENG.												
Maine	60	19	33	0	0	0	0	0	0	0	0	0
New Hampshire	23	15	9	0	0	0	0	0	0	0	0	0
Vermont	27	35	34	0	0	0	0	0	0	0	0	0
Massachusetts	179	196	196	0	0	0	0	0	0	0	0	0
Rhode Island	43	43	36	0	0	0	0	0	0	0	0	0
Connecticut	51	83	67	0	0	1	0	0	0	0	0	0
MID. ATL.												
New York	405	500	393	0	21	23	0	2	0	0	0	0
New Jersey	205	180	180	0	0	0	0	1	0	1	0	0
Pennsylvania	311	180	349	1	0	0	0	0	0	0	0	0
E. NO. CEN.												
Ohio	181	157	209	0	0	0	0	1	0	0	0	0
Indiana	83	27	30	0	1	0	0	0	0	0	0	0
Illinois	111	157	118	0	4	1	0	2	0	0	4	0
Michigan [2]	253	131	174	0	0	3	0	0	0	0	0	0
Wisconsin	190	146	146	0	0	0	0	0	0	0	1	0
W. NO. CEN.												
Minnesota	78	23	29	0	1	0	0	0	0	0	0	0
Iowa	18	27	27	0	1	0	0	1	0	0	0	0
Missouri	8	2	12	0	0	0	0	1	0	0	0	0
North Dakota	16	1	26	0	0	0	0	0	0	0	0	0
South Dakota	5	0	2	0	0	0	0	0	0	0	0	0
Nebraska	8	3	9	0	0	0	0	0	0	0	0	0
Kansas	109	49	49	0	0	0	0	1	0	0	1	0
SO. ATL.												
Delaware	6	8	7	0	0	0	0	0	0	0	0	0
Maryland [2]	109	39	80	0	0	0	1	1	0	0	1	0
Dist. of Col.	42	15	14	0	0	0	0	0	0	0	0	0
Virginia	85	53	63	0	0	0	24	0	0	0	0	0
West Virginia	106	16	49	0	0	0	0	0	0	0	0	0
North Carolina	179	156	286	0	2	0	0	0	0	0	0	3
South Carolina	32	96	96	0	0	2	0	0	0	0	1	1
Georgia	42	29	29	0	2	0	0	0	0	0	8	9
Florida	30	23	23	0	0	0	0	0	0	0	0	12
E. SO. CEN.												
Kentucky	49	101	74	0	0	0	0	1	0	0	0	0
Tennessee	111	23	36	0	2	0	0	0	0	0	2	1
Alabama	52	51	51	0	0	0	0	0	0	0	0	2
Mississippi [2]	-----	-----	-----	0	0	0	0	0	0	0	1	0
W. SO. CEN.												
Arkansas	26	7	18	0	0	7	0	0	0	0	1	0
Louisiana	10	24	23	0	0	0	0	0	0	0	0	0
Oklahoma	33	9	9	0	0	0	0	0	0	0	0	0
Texas	545	181	243	0	24	99	0	1	0	0	6	12
MOUNTAIN												
Montana	16	26	9	0	0	0	0	0	0	0	0	0
Idaho	5	4	5	0	0	0	0	0	0	0	0	0
Wyoming	2	3	3	0	0	0	0	1	0	0	0	0
Colorado	11	55	55	0	0	1	0	0	0	0	0	0
New Mexico	13	36	31	0	0	0	0	0	0	0	0	0
Arizona	29	45	37	0	0	0	4	0	0	0	0	0
Utah [3]	51	30	47	0	0	0	0	0	0	0	0	0
Nevada	0	8	------	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	30	90	79	0	0	0	0	0	0	0	0	0
Oregon	27	29	17	0	0	0	0	0	0	0	0	0
California	394	283	283	0	1	3	0	1	0	0	0	0
Total	4,399	3,414	4,110	1	59	140	29	14	0	1	26	40
13 weeks	51,424	50,708	54,013	20	383	2,602	546	141	5	4	231	637

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Delayed report of one February case in Arizona included.

WEEKLY REPORTS FROM CITIES

City reports for week ended March 20, 1943

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga.	0	0	22	1	14	1	5	0	0	0	0	2
Baltimore, Md.	5	0	2	4	37	18	27	0	67	0	0	82
Barre, Vt.	0	0	------	0	1	0	0	0	0	0	0	0
Billings, Mont.	1	0	------	0	0	0	0	0	0	0	0	0
Birmingham, Ala.	0	0	7	3	1	1	10	0	3	0	0	1
Boise, Idaho	0	0	------	0	1	0	0	0	1	0	0	0
Boston, Mass.	0	0	------	1	186	7	7	0	180	0	0	52
Bridgeport, Conn.	0	0	1	1	3	0	2	0	3	0	0	1
Brunswick, Ga.	0	0	------	0	2	0	2	0	0	0	0	0
Buffalo, N. Y.	0	0	------	1	132	1	4	0	11	0	0	19
Camden, N. J.	1	0	1	0	0	0	7	0	3	0	0	0
Charleston, S. C.	1	0	65	0	0	0	2	0	1	0	0	0
Charleston, W. Va.	0	0	2	0	1	0	0	0	0	0	0	1
Chicago, Ill.	7	0	4	1	594	1	29	0	79	0	1	50
Cincinnati, Ohio	0	0	1	0	73	2	6	0	41	0	0	2
Cleveland, Ohio	1	0	7	1	17	1	12	0	56	0	0	56
Columbus, Ohio	0	0	2	2	11	0	6	0	16	0	1	4
Concord, N. H.	0	0	------	0	0	0	0	0	0	0	0	0
Cumberland, Md.	0	0	------	0	0	0	0	0	1	0	0	0
Dallas, Tex.	0	0	1	1	9	0	4	0	7	0	0	11
Denver, Colo.	5	0	19	0	492	0	11	0	17	0	0	6
Detroit, Mich.	2	0	10	23	295	9	3	0	41	0	1	85
Duluth, Minn.	0	0	------	0	2	0	3	0	7	0	0	3
Fall River, Mass.	0	0	------	0	14	0	0	0	2	0	0	29
Fargo, N. Dak.	0	0	------	0	4	0	0	0	0	0	0	0
Flint, Mich.	0	0	------	0	10	0	9	0	8	0	0	0
Fort Wayne, Ind.	0	0	------	0	1	0	4	0	11	0	0	0
Frederick, Md.	0	0	------	0	5	0	0	0	0	0	0	0
Galveston, Tex.	0	0	------	0	1	0	1	0	1	0	0	0
Grand Rapids, Mich.	0	0	1	0	8	0	0	0	7	0	0	10
Great Falls, Mont.	0	0	------	0	42	0	0	0	3	0	0	6
Hartford, Conn.	0	0	------	0	37	0	8	0	5	0	0	9
Helena, Mont.	0	0	------	0	80	0	0	0	0	0	0	1
Houston, Tex.	2	0	------	1	7	0	9	2	2	0	0	3
Indianapolis, Ind.	0	0	------	3	152	0	8	0	22	0	0	37
Kansas City, Mo.	2	0	------	0	93	3	5	0	69	0	0	6
Kenosha, Wis.	0	0	------	0	2	0	1	0	1	0	0	0
Little Rock, Ark.	1	0	1	0	5	1	3	0	2	0	0	2
Los Angeles, Calif.	4	0	17	2	124	4	8	1	36	0	0	33
Lynchburg, Va.	0	0	------	0	0	1	2	0	0	0	0	4
Memphis, Tenn.	1	0	1	3	81	2	7	0	12	0	0	26
Milwaukee, Wis.	0	0	------	0	376	2	2	0	166	0	0	31
Minneapolis, Minn.	3	0	------	0	30	2	5	0	18	0	0	12
Missoula, Mont.	0	0	------	0	14	0	1	0	0	0	0	0
Mobile, Ala.	0	0	2	2	1	0	5	0	2	0	0	3
Nashville, Tenn.	0	0	------	1	63	0	5	0	2	0	0	4
Newark, N. J.	0	0	4	0	148	2	5	0	11	0	0	15
New Haven, Conn.	0	0	------	0	2	0	0	0	2	0	0	2
New Orleans, La.	0	0	10	1	60	4	7	0	8	0	0	1
New York, N. Y.	17	2	8	6	460	47	103	1	406	0	4	80
Omaha, Nebr.	0	0	------	0	9	0	6	0	9	0	0	4
Philadelphia, Pa.	0	0	------	1	928	12	42	0	113	0	0	88
Pittsburgh, Pa.	0	0	7	4	13	2	18	0	9	0	1	40
Portland, Maine	0	0	------	0	0	3	4	0	1	0	0	14
Providence, R. I.	0	0	17	0	2	5	5	0	3	0	0	20
Pueblo, Colo.	0	0	------	0	4	0	1	0	1	0	0	13
Racine, Wis.	0	0	------	0	13	0	0	0	30	0	0	5
Reading, Pa.	0	0	------	0	197	1	1	0	4	0	0	7
Richmond, Va.	0	0	------	1	7	5	4	0	4	0	0	9

City reports for week ended March 20, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Roanoke, Va	0	0		0	0	0	2	0	0	0	0	0
Rochester, N. Y	0	0		0	30	1	1	0	10	0	0	23
Sacramento, Calif	5	0	1	0	14	3	4	0	7	0	1	4
Saint Joseph, Mo	0	0		0	2	0	6	0	2	0	0	0
Saint Louis, Mo	0	0	8	2	60	14	9	0	17	0	0	10
Saint Paul, Minn	0	0		0	12	1	3	0	7	0	0	34
Salt Lake City, Utah	1	0		0	208	2	0	0	14	0	0	17
San Antonio, Tex	2	0	1	1	8	0	7	0	0	0	0	1
San Francisco, Calif	2	0		0	74	2	16	0	21	0	0	20
Savannah, Ga	0	0	27	6	4	0	3	0	0	0	0	0
Seattle, Wash	0	0		1	97	2	5	0	4	0	0	9
Shreveport, La	0	0		0	0	0	4	0	1	0	0	0
South Bend, Ind	0	0		0	15	0	0	0	3	0	0	1
Spokane, Wash	0	0	1	1	152	1	8	0	0	0	0	8
Springfield, Ill	0	0		0	8	0	2	0	4	0	0	8
Springfield, Mass	0	0		0	11	1	2	0	82	0	0	0
Superior, Wis	0	0		0	3	0	0	0	2	0	0	6
Syracuse, N. Y	0	0		0	29	0	4	0	23	0	0	29
Tacoma, Wash	0	0		0	23	0	3	0	1	0	0	0
Tampa, Fla	0	0		0	4	0	3	0	0	0	0	2
Terre Haute, Ind	0	0		0	11	0	1	0	0	0	0	4
Topeka, Kans	0	0		0	189	0	0	0	1	0	0	3
Trenton, N. J	0	0	1	0	69	0	3	0	9	0	0	2
Washington, D. C	1	0	4	2	100	3	9	0	16	0	0	26
Wheeling, W. Va	0	0		1	5	0	1	0	1	0	0	2
Wichita, Kans	0	0		0	40	0	0	0	1	0	0	8
Wilmington, Del	2	0		1	23	0	6	0	2	0	0	1
Winston-Salem, N. C	0	0		0	0	0	1	0	0	0	0	31
Worcester, Mass	0	0		0	381	1	5	0	13	0	0	4
Total	66	2	254	79	6,436	168	527	4	1,745	0	9	1,151
Corresponding week 1942	78	2	167	45	5,234	49	535	4	1,652	1	13	1,132
Average, 1938-42	92		459	[1] 59	[2] 4,762		[1] 516		1,661	15	21	1,095

Anthrax.—Cases: Camden, 1.
Dysentery, amebic.—Cases: Boston, 1; New York, 14.
Dysentery, bacillary.—Cases. Buffalo, 1; Los Angeles, 3; New York, 1; Philadelphia, 8.
Dysentery, unspecified.—Cases: San Antonio, 3.
Tularemia.—Cases: Nashville, 1; New Orleans, 1.
Typhus fever.—Cases: Houston, 1; Savannah, 2.

[1] 3-year average, 1940-42.
[2] 5-year median.

DEATHS DURING WEEK ENDED MARCH 27, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Mar. 27, 1943	Corresponding week, 1942
Data for 90 large cities of the United States:		
Total deaths	9,858	9,040
Average for 3 prior years	9,001	
Total deaths, first 12 weeks of year	121,158	111,297
Deaths under 1 year of age	692	632
Average for 3 prior years	571	
Deaths under 1 year of age, first 12 weeks of year	8,588	6,870
Data from industrial insurance companies:		
Policies in force	65,462,918	65,017,199
Number of death claims	13,135	13,181
Death claims per 1,000 policies in force, annual rate	10.5	10.6
Death claims per 1,000 policies, first 12 weeks of year, annual rate	10.7	10.3

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 6, 1943.—During the week ended March 6, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	1	20		194	242	20	19	13	69	578
Diphtheria	2	14	4	21	5	5	1		1	53
Dysentery (amebic)						1				1
Dysentery (bacillary)				10						10
German measles		4		5	28	1	1	4	6	49
Influenza		4	9		173	11			44	241
Measles		21	2	140	270	51	197	21	69	771
Meningitis, meningococcus	1	1		3	3			1	2	11
Mumps	8	167	13	67	1,216	141	100	137	144	1,993
Scarlet fever		13	9	100	127	22	20	49	20	360
Tuberculosis (all forms)	2	2	7	100	49	15	6	3	17	201
Typhoid and paratyphoid fever				15						15
Whooping cough		1		53	103	36	6	15	12	226

NEW CALEDONIA

Notifiable diseases—Year 1942.—During the year 1942, certain notifiable diseases were reported on the island of New Caledonia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	27	6	Poliomyelitis	1	
Diphtheria	3		Tuberculosis	16	11
Plague (human)	2	1	Typhoid fever	9	5

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Typhus Fever

Bulgaria.—For the period January 14 to February 3, 1943, 136 cases of typhus fever were reported in Bulgaria.

Hungary.—For the week ended March 13, 1943, 56 cases of typhus fever were reported in Hungary.

Rumania.—For the period March 8–15, 1943, 497 cases of typhus fever, including 34 in Bucharest, were reported in Rumania.

Union of South Africa.—During the month of December 1942, 224 cases of typhus fever were reported in Union of South Africa.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

THE PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics. pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Aug.

Public Health Reports

VOLUME 58 APRIL 16, 1943 NUMBER 16

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol. 58 • APRIL 16, 1943 • *No. 16*

AN OUTBREAK OF DERMATITIS FROM AIRPLANE ENGINE COVERS[1]

By LOUIS SCHWARTZ, *Medical Director*, and SAMUEL M. PECK, *Surgeon (R)*, *United States Public Health Service*

A recent outbreak of dermatitis among workers in a factory making airplane engine covers was investigated with a view of discovering the cause, and, if possible, effective means of prevention. Although the number of cases was small the outbreak is significant, since airplane engine covers are being used extensively to replace the usual antirust compounds with which engines are covered before they are shipped to the assembly plant, where these compounds must be removed and the engine cleaned before being tested and installed. As a labor-saving measure, therefore, wider use of these covers is to be expected. In this factory the covers are made of pliofilm, a material that has been in use for many years with no record of resultant dermatitis. In fact, pliofilm has been recommended as a suitable material for sleeves and aprons to protect certain workers against industrial skin irritants.

The investigation was begun with an inspection of the factory from which the pliofilm was obtained, to observe the actual process of manufacture and to obtain materials for testing purposes. It was found that for the past year a special type of pliofilm has been manufactured especially for airplane engine covers and that an unusual number of cases of dermatitis has occurred among persons engaged in this work.

MANUFACTURING PROCESS

Pliofilm (rubber hydrochloride) is made from natural rubber by first dissolving the rubber in benzol and reacting the solution with hydrochloric acid gas, then neutralizing with an alkali. Various sensitizers are added during the neutralization process. The special pliofilm for engine covers was made in this manner, but a chemical known at the factory as R. M. F. was added to prevent the pliofilm from deteriorating when exposed to light. The outbreak of dermatitis among the workers was noted soon after this chemical was introduced into the manufacture of the special pliofilm.

[1] From the Dermatoses Investigations Section, Division of Industrial Hygiene, National Institute of Health.

The manufacturing process is divided into two stages, one the "wet" stage and the other the "dry" stage. It was found that both processes were well enclosed, but not totally so. As stated above, only an occasional case of dermatitis occurred among the workers before the manufacture of the special pliofilm was begun, and these occasional cases occurred only among workers engaged in the "wet" stage of manufacture, the alkalies, acids, and solvents used in the "wet" stage being the cause of these occasional cases of dermatitis.

Since the introduction of R. M. F. into the pliofilm, not only has there been a marked increase in the number of cases of dermatitis occurring in workers in the "wet" stage of manufacture, but workers in the "dry" stage of manufacture have also been affected. There were some cases even among workers who handled only the finished product. Of 10 workers seen in the department where the special pliofilm was manufactured, all stated that they had had dermatitis at some time since they began working with the new product. Actually, however, only three cases were seen in this department at the time of the inspection. One other case of dermatitis was seen among 3 workers who handled only the finished new product.

Patch tests performed on the workers in this plant showed that R. M. F. was the actual cause of the dermatitis. This substance is a crystalline product soluble in benzol but insoluble in water. It has the property of counteracting the deteriorating action which light has upon ordinary pliofilm. The actual chemical composition of R. M. F. is a trade secret and cannot be revealed. In the process of experimentation to determine the quantity necessary to prevent the deterioration of pliofilm, amounts varying from 1 percent to 5 percent had been incorporated in various batches of the material.

The name of the plant where the special pliofilm was laminated was obtained from the manufacturers of the pliofilm and this plant was next visited. It was found that this plant not only laminated the pliofilm but also made some of it into airplane engine covers. Pliofilm sheets are laminated (cemented together) by means of a rubber cement. The workers on these machines have but little contact with the pliofilm, the process being automatic. There were no cases of dermatitis observed among them.

In another part of the plant 65 girls are employed in making and folding the bags made from the laminated pliofilm. Some of the girls heat-seal the fabric by means of a hot electric iron. A certain amount of fuming occurs in this operation and the fumes strike the operator's face and may cause dermatitis, most marked on the thin skin around the eyes (fig. 1).

When the finished bags are being folded for shipment, the girls must insert their arms into the bags and in doing this they actually rub the flexor surface of the forearms and elbows against the pliofilm. Twenty

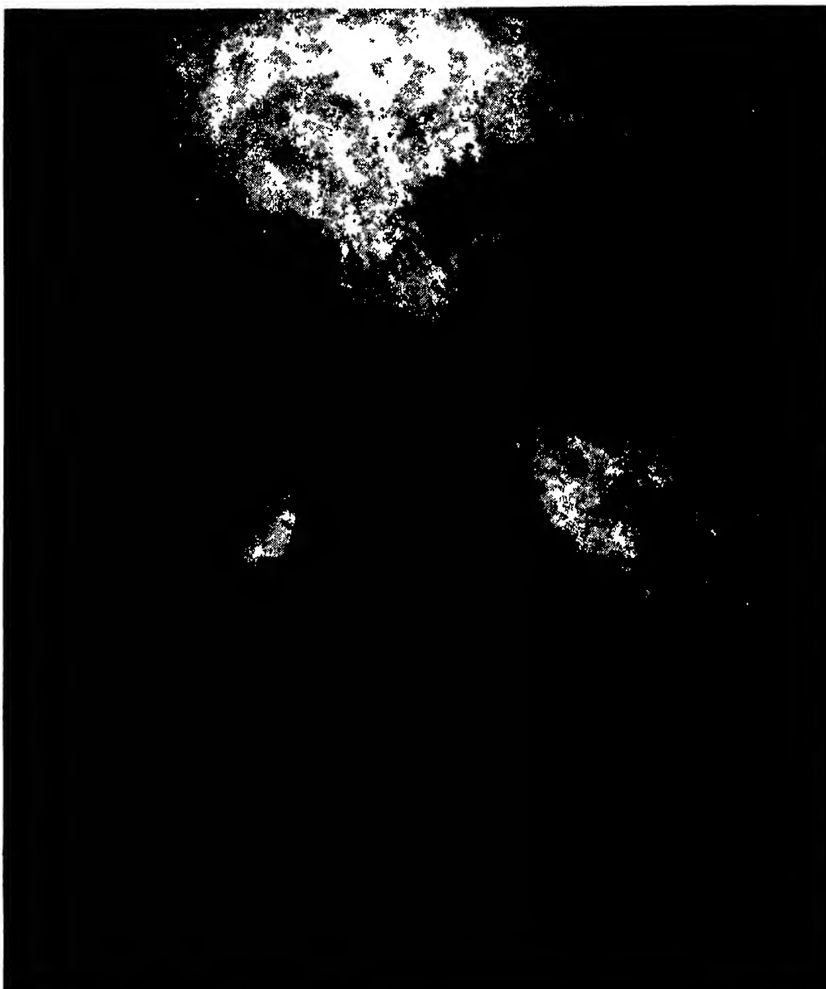


FIGURE 1.—Note inflammation of face.

FIGURE 2.—Dermatitis of flexor surfaces of arms

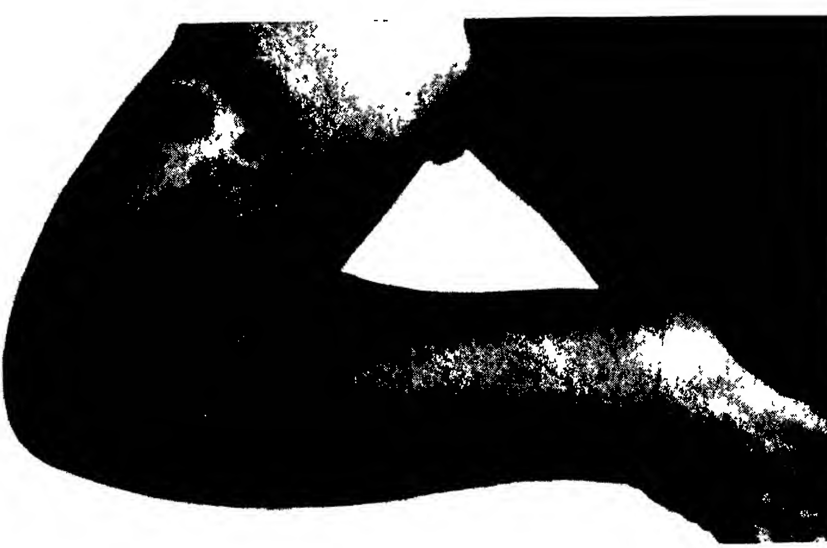


FIGURE 3.—Positive patch test to inhibitor in pliofilm

cases of dermatitis occurred among these girls. Two of the cases were among those who heat-seal the fabric and the others occurred among the girls who fold the bags. The dermatitis was mild and none of the girls affected lost time from work. At the time of the investigation three cases of dermatitis were observed. Mild scaling and erythema of the flexor surface of the forearms (fig. 2) and the elbows was noted, especially on the right elbow and its cubital space. Two such cases occurred among the girls who fold the bags and one employed at heat-sealing had, in addition to dermatitis of the forearms and elbows, a scaling eruption on the sides of the neck. In this plant it was also found that dermatitis appeared shortly after the women began working with the new pliofilm. Examinations of various batches of pliofilm sheets showed that some of the batches had on them a whitish deposit of powder, or "bloom."

With this information, the plant from which the original complaint was made was visited. In this plant, airplane engine covers are manufactured from the laminated pliofilm in exactly the same manner as in the plant previously described. Girls were employed in the pliofilm department. The medical records of the company showed that 15 cases of dermatitis had occurred among the 80 workers and that all the cases had occurred since the introduction of the special pliofilm. Although the workers who had developed dermatitis were still working at the plant, some had been moved to work in which they were not required to handle the pliofilm. It was usual in this plant to transfer a girl who developed a severe dermatitis to the job of cementing gaskets which were then placed on the pliofilm by another worker, one who had not developed dermatitis. However, since the whole process was performed in one room, contact with the pliofilm was almost unavoidable. Many of these girls recovered from their dermatitis while cementing gaskets, but it was impossible to determine whether this was "hardening" or whether it was due to insufficient contact with the material. Fourteen of the fifteen patients with dermatitis were actually examined. One still had a severe eruption, 10 had a mild eruption, and in 3 it had entirely disappeared.

The time from first exposure to the appearance of dermatitis varied from 2 weeks to 11 months (table 1). Most of the cases began to develop about 4 months after exposure.

Among those employed in heat-sealing, the eruptions occurred mostly on the face, especially the eyelids, nose, mouth, and chin. A few of these girls also developed eruptions on the sides of the neck and the lobes of the ears. As the duration of exposure continued, the forearms and even the hands became involved.

Girls employed in bag folding had the forearms and the cubital space first affected and then the sides of the neck, the face, and eyelids. *The palms were free of lesions in all cases.*

TABLE 1

Number	Patient	Contact with special pliofilm	Occupation	Onset of dermatitis (time before examination)	Results of patch tests (a)	(b)	(c)	(d)	(e)	(f)	Remarks
1	H. S.	9 months	Forelady	6 months	0	+++	+	0	0	0	Slight dermatitis on forearms. No flare-up.
2	L. C.	1 year	Heat sealer	11 months	0	++++	0	0	0	0	Lesions on face which were quiescent lit up.
3	D. H.	1 year	do	5 months	0	+++	0	0	0	0	Marked flare-up of lesions on face, hands, and shoulders.
4	— K.	7 months	do	3 months	0	++++	0	0	0	0	Was previously free of eruption after patch marked flare-up
5	B.	8 months	Bag folder	5 months	0	+++	0	0	0	0	Marked flare-up of face, eyes almost closed.
6	Ku.	1 year	do	9 months	0	++++	+	0	+	+	Marked flare-up of face and arms.
7	L.	6 months	Heat sealer	6 weeks	0	++	0	0	0	0	No flare-up. Original dermatitis slight
8	S.	1 year	do	7 months	0	++	0	0	0	0	Flare-up finger, neck as a diffuse erythema previously clear.
9	H.	7 months	do	4 months	0	++++	0	0	0	0	Marked flare-up of face and arms.
10	K.	6 months	Sealer and folder	5 months	++	++++	+	0	0	0	Moderate flare-up.
11	T.	6 months	Bag folder	6 weeks	0	++++	+++	0	+	0	Slight flare-up
12	O. P.	7 months	Scrap handler	2 weeks	0	+++	++	0	0	+	Moderate flare-up.
13	H. R.	1 year	Bag folder	7 months	0	++	0	0	0	0	Moderate flare-up.
14		3½ months	Heat sealer	2 weeks	0	++	0	0	0	0	Flare-up.
15	Control S. L.	Control			0	++	0	0	0	0	
16	B. P.	Control			0	++	0	0	0	0	
17	P. Q.	Control			0	++	0	0	0	0	
18	D. S.	Control			0	++	0	0	0	0	Positive reaction developed in 48 hours—72 hours vesiculation. For 6 hours after removal of patch, very little reaction.

Patch test materials:
(a) Cement used in laminating the pliofilm
(b) R. M. F. 50 percent solution in benzol.
(c) Finished laminated special pliofilm.
(d) Ordinary pliofilm
(e) Pliofilm containing 1 percent of R. M. F. before lamination.
(f) Finished laminated special pliofilm, covered with "bloom."

Discoloration of several of the fingernails was observed in one patient. This symptom was said to be present in some of the other workers but was not noted at the time of examination.

There were several distinct types of lesions seen in the same individual. One was an oval, erythematous, sharply circumscribed lesion neither papular nor vesicular; it resembled a well developed lesion of pityriasis rosea. Another type was similar but had a tendency to clear in the center with papules and vesicles at the periphery. Still another type showed various sized irregularly round patches arranged in irregular semicircles resembling an erythema multiforme, but differing in that the lesion was covered with fine scales. This type of eruption tended to be symmetrical and occurred on the flexor surface of the forearms. In some of the affected workers, almost the whole flexor surface of the forearm was erythematous and scaly with some extension even to the extensor surface. A number of the cases exhibited a frank contact dermatitis with papules, vesicles, crusting, fissures, etc., occurring on the dorsum of the hands, the fingers, and the ulnar surface of the forearms.

Lesions on the face consisted mainly of erythema, edema, and superficial scaling. The lobes of the ears showed vesiculation and crusting.

In table 1 is given the data on the results of patch tests which were performed on 14 employees who had had dermatitis from the special pliofilm, and on 4 controls. The patch tests were performed with (a) the cement used in laminating the pliofilm, (b) the R. M. F. in 50 percent solution in benzol, (c) the finished laminated special pliofilm, (d) a sample of ordinary pliofilm, (e) a sheet of pliofilm containing 1 percent of R. M. F. before lamination, and (f) finished laminated special pliofilm which was then being used in this plant for making airplane bags. Sample "f" was covered with a distinct "bloom."

In applying the cement patch, it was first placed on a piece of gauze and then allowed to dry in order to eliminate the action of the solvent on the skin. The same method was followed with patch "b." The patches were allowed to remain on for 24 hours. Positive reactions to patch tests with R. M. F. were observed in the 14 who had had pliofilm dermatitis and also in the 4 controls, giving evidence that R. M. F. is a primary skin irritant.

Nearly all the patients who had had pliofilm dermatitis showed an extension of the reaction beyond the actual area of the skin covered by the patch, while the reaction on the controls was sharply limited to the area covered by the patch. The reaction on the girls who had had dermatitis was marked, the erythema, inflammation, and vesicles being more pronounced than on the controls.

Five of the 14 girls showed a positive patch test to the pliofilm which contained the R. M. F. (fig. 3). Two of the 5 also showed a reaction to patch "e" which was known to contain only 1 percent of R. M. F. One of the 2 was also sensitive to patch "f" and one other girl who was not sensitive to patch "e" but was sensitive to patch "f" was also sensitive to patch "c." It will be noted that those who gave the strongest positive reactions to the R. M. F. itself were the ones who showed reactions to the special pliofilm containing R. M. F.

The chemical nature of the "bloom" noted on the special pliofilm was not ascertained, but it may be possible that covers which contained the most "bloom" caused the most dermatitis, since samples obtained at the factory showed more "bloom" than any of the others tested.

Of the 14 cases of pliofilm dermatitis patch tested, 12 showed a flare-up of the previous eruptions, even though these eruptions had disappeared several weeks or months before. The flare-up in one case was severe, swelling of the eyes and face necessitating hospitalization.

Results of the patch testing show that the outbreak of the dermatitis was due to the presence of R. M. F. in the pliofilm and that R. M. F. is not only a primary skin irritant but also a sensitizer.

The oval patches of dermatitis resembling pityriasis rosea described above were probably due to primary irritation of the arms by the R. M. F. since the special pliofilm rubbed against the skin. The symmetrical lesions resembling erythema multiforme may be accounted for as being an allergic eruption due to the absorption of the R. M. F. through the skin. The eczematoid eruptions were contact allergic dermatitis. The fact that such a high percentage of those tested showed a flare-up demonstrates that R. M. F. is a powerful sensitizer.

The patch test with the R. M. F. itself was performed in order to find out whether it is a primary irritant and also if it accentuates the reaction that may occur from the patch test with the film.

Contact of the finished fabric with the skin under a patch test may not simulate actual conditions and may not bring a sufficient amount of the sensitizing substance in contact with the skin to elicit a reaction. When a sensitized person comes in contact many times with different pieces of fabric containing the same sensitizer sufficient quantities come off the fabric and come in contact with the skin to cause dermatitis, whereas one small piece of the fabric contained in a patch test may not have sufficient amount of the chemical to cause dermatitis except in persons who are highly sensitive. When sufficient amount of the sensitizer in the form of the R. M. F. patch tests was placed in contact with the skin, not only did the positive reaction develop but

there was also a generalized flare-up caused by absorption of the substance through the skin.

The flare-up which occurred in 12 of the girls furnished the strongest proof that this was a sensitizer in spite of the primary irritant reaction.

The presence of a positive reaction to the patch test in all of the workers who had given a history of dermatitis also proved that complete "hardening" had not occurred.

SUMMARY

1. An outbreak of dermatitis was observed among workers manufacturing airplane engine covers made from a special pliofilm.
2. R. M. F., a chemical added to the pliofilm to prevent deterioration from light, was found to be the actual cause of the outbreak.
3. R. M. F. is both a primary irritant and a sensitizer.

RECOMMENDATIONS

In order to prevent further attacks of dermatitis, it is suggested that workers handling pliofilm containing the R. M. F. should wear protective sleeves and aprons made of ordinary pliofilm, vinylite, koroseal, or laminated cellophane. The hands may be protected by wearing gloves made of washable leather or finely knitted cotton. Persons on the job of heat-sealing can protect their faces from the irritant fumes developed during the operation by the use of a protective ointment of the invisible glove type. It is recommended that all workers adopt these measures.

Workers who continue to have dermatitis after observing the recommended precautions should be removed from further exposure to the material.

MURINE TYPHUS FEVER CONTROL [1]

By C. R. Eskey, *Medical Director, United States Public Health Service*

During the 10-year period 1932 to 1941 approximately 20,000 cases of murine typhus fever were recorded officially in the United States. The number of cases reported increased from 900 in 1932 to 2,700 in 1941. During 1942, more than 3,700 cases were reported.

From evidence gathered in the field, however, it is apparent that this disease is much more prevalent than is indicated by official records. For example, after making a survey of the incidence of typhus in a southern State one investigator reported that in his opinion not over one-fifth of the cases occurring in the State were being reported. This conclusion is supported by the 1942 records for certain counties in the same State which show that these counties

[1] From the States Relations Division.

report less than one-fifth as many cases as neighboring counties in two adjacent States. In another State it was found that during 1941 four hospitals in a certain city treated over 100 cases of typhus fever whereas only 40 cases were reported in the entire county in which the hospitals were located. While investigating a single reported case during the summer of 1941, a county health officer in this State discovered 5 persons ill with typhus fever. Many local health officers admit that the disease is much more prevalent than is indicated by official records, and some of them in southern localities believe it is becoming as serious a problem as malaria in the areas under their jurisdiction.

European, or epidemic typhus, has a much higher death rate than murine typhus. Nevertheless, the latter form of the disease should not be regarded lightly. If the patient with murine typhus is more than 60 years old, the chances of recovery are not good; young adults are usually acutely ill for 2 weeks. The febrile stage is commonly followed by a convalescence period of 2 months or more before the patient fully regains his strength. Since most cases of murine typhus occur among adults over 18 years of age, it is evident that typhus fever presents a serious economic problem. Not only is medical treatment costly, but wages are lost during the frequently prolonged period of disability.

Most cases of human infection with the rickettsiae of murine typhus are traceable to typhus-infected domestic rats. Control of the disease therefore is based on the difficult task of eradicating the rodent reservoir of infection. This can be accomplished only by exterminating infected rats from places where they come in close contact with man or by reducing the rat population of the infected area to the point where the opportunity for spread of the disease from rat to rat becomes negligible. The measures necessary to achieve either of these objectives will depend upon the degree of rat infestation and upon the local environmental factors favoring the existence of the parasitic vectors.

Statistics of the prevalence of typhus fever in the United States indicate that the conditions suitable for its dissemination vary greatly from north to south. During 1941 only 2 percent of the reported cases occurred in States north of a line extending across the country at the level of the southern boundary of Kentucky. Only 18 percent of the cases were reported from the area between this line and another one traversing the northern boundary of Louisiana. This area includes approximately the territory between 36°30′ and 33° north latitude.

In the region south of 33° north latitude, where murine typhus is most prevalent, many cases are reported from farms and small villages. In tracing the incidence of infection northward, however,

it is found that the farther north the disease occurs the more the infection tends to be limited to the larger urban communities. The prevalence of rural typhus in the deep South may be attributed, in part at least, to the large rural rat population in this region. In the deep South the length of the warm season and the types of crops favor the existence and multiplication of domestic rats in the fields during the greater part of the year. Other factors besides the degree of rat infestation, however, must play a part in determining the incidence of murine typhus in the different latitudes of the United States. This is evident from a comparison of the incidence of typhus fever in five port cities shown in table 1. There is no reason to believe that the rat infestation in any one of these cities is substantially greater than in any of the others. Therefore it seems likely that the varying prevalence of the disease in these cities is attributable to differences in climate. Climatic conditions in the more northern cities are less suited to the existence of the parasitic vectors of the infection.

TABLE 1.—*Reported incidence of typhus fever in five port cities*

City	Population	Approximate latitude	Cases of typhus reported, 1938–41
Philadelphia, Pa	1,931,344	40°	3
Baltimore, Md	859,100	39°30′	11
Norfolk, Va	144,[illegible]	36°40′	17
Charleston, S C	[1] 121,[illegible]	32°40′	[1] 176
Savannah, Ga	[1] 117,970	32°	[1] 350

[1] These figures are for the county in which the city is located

If the incidence of human typhus can be considered an index of the degree of rat infection in different localities, it would seem that measures which might eradicate the disease in the northern part of the endemic area would not achieve comparable results in places farther south. In the northern communities foci of infection may be limited to rats in certain buildings, while in the more southern localities rat infection is much more widespread, sometimes involving the rats living in the fields. By carefully tracing the sources of infection in regions where rat infection appears to be limited to certain buildings, and then by properly treating the small areas involved, it may be possible to eradicate the disease in northern communities. In the southern portion of the endemic area, where the infection seems to involve the entire rat population, adequate control measures must include all places in the community where rats associate closely with man.

There are no new spectacular methods for destroying domestic rats. The old types of traps, poisons, and fumigants must still be used. By intensive trapping, poisoning, or fumigation, singly or in

combination, it is possible to reduce the rat population of any community to a marked degree. When intensively applied, all of these methods are expensive and each has its disadvantages. Poisoning is the least expensive method and therefore the one most commonly employed. It is simple enough to prepare and distribute poison baits, but it is an entirely different matter to get rats to eat them. Even the most attractive baits so far devised are generally ineffective for eradicating rats from places where there is an abundant supply of food for them, and it is in such places that they are usually most numerous. Under these circumstances unbaited steel traps placed in rat runs are likely to be more effective than poisons. Fumigants are dangerous but they are particularly effective for eradicating rats from large food establishments, provided the gas can penetrate to all places where rats are harboring. Most campaigns to control rats by trapping and poisoning are of short duration because these measures are too expensive to permit city officials to continue them indefinitely. Moreover, no matter how intensively the eradicative measures are conducted, a residue of rats always remains; when the campaign is discontinued these soon multiply and reach their original number.

Properly conducted trapping and poisoning campaigns would undoubtedly tend to reduce the incidence of murine typhus in all parts of the endemic zone. In the northern part of this zone even short-term programs may eradicate the disease until the community is reinfected from outside sources. In the southern region, however, the infection seems to be so widely established among the rat population that it can never be completely eradicated. Hence, sporadic campaigns to destroy rats will lower the incidence of typhus only during the period in which the projects are in effect, or for a short time afterwards. To protect residents in the areas where the disease is most prevalent, control of rats should be placed on a permanent basis.

The costs of permanent programs to control typhus can be brought within the budget of most communities by combining exterior ratproofing of buildings—a type of ratproofing advocated by the Georgia State Department of Health for several years—with the eradicative measures discussed above. This form of rat control consists simply of eliminating all avenues by which rats may enter buildings and then eradicating the rats already present within them. The complete eradication of rats from the interior of the rat-stopped buildings is the most difficult part of such a project; sometimes several months may elapse before the last rat is destroyed.

The standard form of ratproofing, which includes the elimination of all inside harborage, is without doubt the most effective means known for controlling rat infestation of buildings. This type of ratproofing can be instituted at slight extra expense at the time of construction, and it should be required in all building codes. When

applied to old buildings it is generally a very expensive procedure, and for this reason it is impracticable to require complete ratproofing of old buildings in conducting typhus control projects. On the other hand, exterior ratproofing, i. e., rat stoppage, is very inexpensive. The costs rarely exceed $100 per establishment. The measures necessary to seal a building against rats naturally vary with the type and condition of the structure. In the case of three different cities the costs of exterior ratproofing per establishment were $5, $12, and $45. The highest figure represents the costs incurred in one of the oldest cities in the United States.

The Georgia authorities have designated external ratproofing as "vent-stoppage," thus indicating that the procedure consists of closing openings in the exterior walls. But there are other means by which rats may enter buildings, such as burrowing under foundations. Therefore the term "ratstoppage" seems to be more appropriate.

There are two general plans under which ratproofing programs have been conducted in different localities. Under one plan the owners or occupants are expected to make such alterations as are necessary to ratproof their buildings, either doing the work themselves or engaging contractors to do it in accordance with directions furnished by health department inspectors. Under the second plan operations are conducted systematically by personnel of the health department who treat each establishment in sequence as they proceed around a city block. Both methods may be undertaken with or without city ordinances to enforce compliance, but experience has demonstrated that compelling ordinances are essential to obtain optimum results from any rodent control project based on external ratproofing. It is undoubtedly better to have the work done by the health department than by a private contractor. In fact, a project carried out systematically by health department personnel without suitable ordinances is likely to be more effective than one conducted with the aid of enforcing ordinances but dependent upon the owners or occupants of buildings for the actual work necessary to ratproof them. This is true for a number of reasons, of which the following are the most important:

(1) Many persons are willing to have the exteriors of their buildings ratproofed, but they do not want to take the trouble either to do the work themselves or to hire a contractor to do it. Such persons readily consent to have the health department do the job while they pay the moderate costs.

(2) Exterior ratproofing is done more cheaply and efficiently by trained personnel of the health department, who know exactly how to handle each situation, than by most contractors.

(3) During a systematically conducted program the owners of establishments near those where operations are being carried on see

the nature of the work and hear about its benefits from their neighbors. Propaganda such as this frequently sells the program in advance. This type of propaganda is not so readily obtained when private individuals have to institute the measures necessary for exterior ratproofing.

(4) During their surveys for determining the measures necessary for exterior ratproofing, even the best trained inspectors will not always locate all places where rats may enter buildings. Leaks of this nature are often discovered by the health department crew and corrected while they are working on the premises. Sometimes such leaks are not found until an intensive search is made for them as a result of lack of success in freeing the building of rats. Leaks other than those specified are not likely to be discovered or corrected by private contractors. If they are discovered after the owner or occupant has once carried out directions for ratproofing his premises, it may be difficult to induce him to reemploy the contractor.

(5) Finally, exterior ratproofing in itself will not reduce the rat population of a community; not only must rats be kept out of buildings but all the rats inside the treated buildings must be destroyed. The eradication of rats inside buildings can be accomplished much more readily when the rat-stoppage work proceeds regularly block by block than when it is carried out irregularly in scattered areas about the city, as is the case when the initiative is left to owners or occupants.

Municipal governments and other public agencies in some instances have paid part or all of the costs for the exterior ratproofing of private buildings, but few communities are able to raise sufficient funds to conduct rodent control programs in this manner. Furthermore, it is questionable if public funds should be used for this purpose since ratproofing may be considered to increase the value of the buildings treated. Many of the measures employed to prevent rats from entering buildings consist simply of repairs that should have been made regardless of their ratproofing value. The chief economic benefits of exterior ratproofing and interior extermination of rats are derived from the elimination of rat damage to the buildings and their contents. Not infrequently the losses caused by such damage amount to several hundred dollars in a single year. Therefore, from the economic standpoint alone, it would seem reasonable to assess private individuals for the costs of exterior ratproofing of their establishments in the course of a typhus control program. In most instances they will be reimbursed within a short time by savings accruing from the elimination of rat damage.

In practically all typhus control programs of the type under discussion ratproofing operations have been limited to the business sections of cities. The work is started in blocks containing establish-

ments which have been implicated as the probable sources of human infection. From these blocks activities are extended to others containing rat-infested food establishments or areas where rats are numerous. Programs are now under way in which ratproofing is applied only to buildings housing food establishments; all other buildings are passed by unless they are known to harbor many rats. If rats cannot be eradicated readily from a building that has been passed by, the construction crew returns and ratproofs it. If garbage or waste food is properly stored, and if the exteriors of all food establishments are ratproofed, the food supply of the rats will be eliminated in that part of the city and they will not be able to survive there. In areas where typhus is most prevalent, ratproofing operations should be extended to all outlying food establishments, including buildings where domestic animals are housed, and in some instances even to private dwellings.

If a permanent typhus control program based on external ratproofing is to be carried out successfully, it must be understood at the outset that there are no means by which the exteriors of buildings can be ratproofed permanently. Damage caused by trucks backing into doors, or failure to replace broken screens, may open up new avenues for reinfestation. Rats may also gnaw their way into ratproofed buildings, or they may gain entrance through doors or windows left open. Periodic inspections must be made of the ratproofed areas so that new leaks can be located and signs of reinfestation discovered before a new rat population has time to develop. Unless continuous surveillance can be maintained over rat-stopped buildings, many of them will soon harbor as many rats as they did prior to treatment. The local health department of a city of 20,000 should employ at least one thoroughly trained man to make the necessary inspections and two laborers to do trapping and construction work. Larger cities will require proportionally more personnel to maintain the treated buildings in a ratproof condition and to eradicate rats that may find entrance into them. Such a maintenance force is much smaller than that needed to carry on a continuous trapping and poisoning campaign without the assistance of ratproofing.

Ordinances enacted by city councils to insure success of a typhus control program based on permanent reduction of rats through exterior ratproofing should:

(1) Require all business places and other structures which may harbor rats to be ratproofed exteriorly as directed by the health officer and maintained in a rat-free condition.

(2) Require the owner, agent, or occupant to institute such other measures as are necessary to ratproof their premises according to the directions of the health officer or pay the costs of such measures when carried out by the health department.

(3) Require all waste food or garbage upon which rats may feed to be stored so that it is inaccessible to the rodents.

(4) Require that all premises be kept free of rubbish that may afford harborage for rats, and that materials kept out-of-doors be stored so that rats cannot harbor in or under them.

(5) Require that all new buildings be ratproofed during construction.

(6) Provide penalties for noncompliance.

There is no question that a great reduction in rat population may be obtained by systematic rodent control projects based on exterior ratproofing of buildings, but the sustained effect of such programs on the incidence of murine typhus will depend upon the extension and maintenance of the projects.

TYPHUS FEVER CONTROL UNIT OF THE UNITED STATES PUBLIC HEALTH SERVICE

The Typhus Fever Control Unit of the Public Health Service, with offices at 41 Exchange Place, Atlanta, Ga., is cooperating with State and local health departments in several programs based on exterior ratproofing in order to control the incidence of murine typhus fever in military or war industry areas. These projects not only serve a wartime purpose in reducing the morbidity from this infection, but they also demonstrate that rat infestation can be controlled permanently at a relatively low cost to the local health departments. Furthermore, the programs afford opportunity for training local personnel in all aspects of rodent control so that the work can be continued and maintained after withdrawal of the Public Health Service.

The Public Health Service is willing to cooperate in typhus control programs to the full extent of its resources in all defense areas where murine typhus is a serious public health problem, provided local authorities will comply with the following requirements which are necessary to insure the success of the projects:

(1) Enact suitable ordinances.

(2) Provide one or more inspectors for training so that the program may continue after the Public Health Service withdraws its personnel.

(3) Provide someone to handle all local finances.

(4) Provide the laborers needed to do the construction work and trapping. The laborers' wages can be charged against the owners or occupants of buildings that are ratproofed.

(5) Obtain a loan from the city, chamber of commerce, or other agency in order to purchase in advance sufficient critical materials and tools to carry out the proposed project. This money will be paid back as collections are made for work completed.

(6) The local health department must agree to extend and maintain the program.

At the present time the Typhus Control Unit is able to furnish the following assistance to local health departments for conducting programs to limit the spread of murine typhus:

(1) Provide, according to the requirements of each program, one or more trained sanitary inspectors capable of conducting all the different activities of a typhus control project as follows:

(*a*) Make preliminary surveys to determine the extent of rat infestation of each building, the measures necessary for ratproofing it, and the costs of each job.

(*b*) Supervise the work of the laborers engaged in ratproofing.

(*c*) Supervise the trapping and poisoning operations.

(*d*) Train local personnel assigned to the program in all aspects of the work.

(2) Provide trained personnel and apparatus needed for cyanide fumigation of rat-infested buildings when this is necessary.

(3) Furnish some of the automotive equipment needed to carry on rodent control operations.

(4) Provide from two to four laborers to assist in rat eradicative measures, to service Government property, and to collect parasites for classification and study.

(5) Lend sufficient rat-traps for the programs.

(6) Assist in procuring critical materials.

(7) Provide senior personnel to inspect the progress and character of the work at frequent intervals.

(8) Assist local health departments in promotional activities, and make preliminary surveys to determine the approximate amount of materials needed for the programs.

(9) Assist in formulating suitable local ordinances.

The Typhus Control Unit cannot provide assistance indefinitely, but it will assist in the conduct of local programs until the personnel of the health department is capable of carrying on the work in a satisfactory manner. Generally the local health department should be able to conduct all operations in from 4 to 6 months after a program is started.

The results obtained thus far from all typhus control programs in which the Public Health Service has participated have been very gratifying. Local health officers have all expressed satisfaction with the projects, while many occupants of treated buildings have been especially generous in their praise of the work. After an exterior ratproofing program gets under way, word of its value in reducing rat damage soon spreads from one business man to another and makes extension of the project relatively easy.

515734°—43——3

PLAGUE INFECTION REPORTED IN THE UNITED STATES DURING 1942

IN HUMAN BEINGS

One case of plague in human beings was reported in the United States during the calendar year 1942. The case occurred in Siskiyou County, Calif., in a child 2½ years of age, with onset on November 8 or 9. The patient recovered. The diagnosis was confirmed at the United States Plague Laboratory in San Francisco, Calif.

The source of the infection was not definitely determined. For about 2 weeks prior to the onset of the disease, the father of the child had been hauling hay from a known rodent plague area in the county in which two fatal cases occurred in 1941,[1] and where several pools of fleas from ground squirrels were subsequently found to be plague-infected. The patient had played in the hay in the barn, where pack rats had been observed. Evidence of mice infestation was found in the home, but there were no visible signs of the presence of ground squirrels in the vicinity. The ground was covered with snow, however, and the weather was cold. Plague infection was found during the year in specimens of tissue and in fleas from ground squirrels taken in several localities of the county.

IN RODENTS AND ECTOPARASITES

During the year the number of mobile laboratories utilized by the Public Health Service in making field plague surveys was increased from 4 to 10. In addition, the following named States operated field units: California (8 units), Oregon (2), Montana (1), Idaho (1), and Washington (1). Six Public Health Service units were engaged in making a survey from the Rio Grande to the Canadian border between the 100th and the 105th longitude meridians for the purpose of determining the eastern limits to which the infection had been spread. The United States Public Health Service Plague Laboratory in San Francisco examined all specimens submitted by all these field units.

Plague infection was reported during the calendar year 1942 in rats, wild rodents, or ectoparasites from rodents in six western States—California, Idaho, Montana, Nevada, Oregon, and Washington. Surveys were made in the environs of nearly all the principal military establishments situated in the Western States, with particular attention being directed to cantonments in or near locations where plague infection had been found in recent years.

Plague infection was reported in the following named animals, or their ectoparasites, in addition to ground squirrels: California—jack rabbits, marmot, chipmunks, mice, wood rats, pack rats, cottontail

[1] Public Health Reports, 57: 903; 1879-80 (1942).

rabbits, brush rabbits, and gopher; Idaho—marmots; Oregon—marmots and badger; Washington—rats. The infected ectoparasites include fleas, lice, and ticks.

Infection was reported in fleas from rats in Oakland, Calif., in animal tissue and pools of fleas and lice from rats in Tacoma, Wash., in ectoparasites or tissues from animals taken at Fort Cronkhite, Camp Mendell, and Fort Baker, Marin County, Calif., on the Fort Ord and the Hunter Liggett military reservations, Monterey, Calif., at various localities in Siskiyou County, Calif., where the human case occurred during the latter part of the year, and near Gowen Field Air Base at Boise, Idaho.

The accompanying table lists the areas in which plague infection was reported to the Public Health Service during 1942. It is not to be inferred that these reports give the complete picture of the area of infection among field rodents in the Western States, as the field forces engaged in the work, the areas included in the investigations, and the seasonal periods during which the work can be undertaken are limited. They do, however, demonstrate the continuance of a wide distribution of plague infection in western United States.

The presence of plague infection in animal tissues or parasites was demonstrated by laboratory examination, inoculation of laboratory animals with tissue from rodents, and mass inoculation with emulsions of parasites.

Plague infection in rats, wild rodents, and their ectoparasites reported to the Public Health Service during 1942

State and county	Date [1]	Infection found in—
California:		
Alameda County	Sept. 19	Pool of fleas from 9 ground squirrels (*C. beecheyi*) taken 2 miles south of Pleasanton.
Do	Oct. 14-16	4 pools of fleas from rats taken in Oakland districts.
Alpine County	Sept 15	2 pools of fleas from 4 wood rats and 23 chipmunks taken 1 mile west of Woodford.
Eldorado County	July 27	3 specimens of tissue and 2 pools of fleas from ground squirrels (*C. beldingi*) taken 3 miles north of Meyers.
Do	Aug. 3-6	5 specimens of tissue from ground squirrels and chipmunks taken 3 miles north of Meyers, and 1 specimen of tissue from 10 ground squirrels taken 1 mile north of Meyers.
Do	Aug. 4	2 pools of fleas from golden mantled ground squirrels and chipmunks collected near Meyers
Do	Aug. 7	Tissue from ground squirrels taken 1 mile north of Meyers.
Kern County	Apr. 30	Pool of fleas taken from ground squirrel burrows near California State Institution for Women.
Do	May 4	Pool of fleas from chipmunks (*Eutamias* sp.) taken 2 miles south of Davis Ranger Station.
Do	May 5-6	3 pools of fleas collected from ground squirrels (*C. beecheyi*) and burrows 1 mile east of Lebec.
Do	June 9	Pool of lice from 73 ground squirrels (*C. beecheyi*) taken near Castac Lake.
Do	July 29	Pool of fleas from ground squirrels taken near El Tejon School, and another pool of 2 ticks from 1 jack rabbit taken 10 miles west of Wheeler Ridge.
Do	July 30	2 pools of fleas and lice from ground squirrels collected 12 miles east of Wheeler Ridge, and 1 pool of fleas from ground squirrels taken near Tehachapi.
Do	Aug. 5	Pool of fleas from 9 ground squirrels (*C. beecheyi*) taken near Lebec.

[1] In most instances the date when the specimens were collected.

Plague infection in rats, wild rodents, and their ectoparasites reported to the Public Health Service during 1942—Continued

State and county	Date	Infection found in—
California—Continued.		
Lassen County	Apr. 15	2 pools of fleas from ground squirrels (*C. beecheyi*) collected near Doyle and 2 pools of fleas from ground squirrels (same species) taken near Milford.
Do	Apr. 16	Pool of fleas from 1 ground squirrel (*C. beldingi*) taken near Doyle.
Do	Apr. 20	Pool of fleas from ground squirrels (*C. beecheyi*) taken 1½ miles south of Milford.
Do	Apr. 21	Pool of fleas from 1 ground squirrel (*C. beecheyi*) taken near Doyle.
Do	Apr. 22	Pool of fleas from ground squirrels (*C. townsendi*), and tissue from 1 ground squirrel (*C. oregonus*) taken 3 miles south and 9 miles east of Amedee.
Do	May 21	Tissue from 1 marmot taken southeast of Adin.
Do	May 31	Pool of fleas from 1 ground squirrel (*C. beldingi*) and tissue from 1 ground squirrel (same sp.) collected 3 miles south and 9 miles east of Amedee
Do	June 2	Tissue from 1 ground squirrel (*C. beldingi*) taken 3 miles south and 9 miles east of Amedee
Do	June 3	Tissue from 1 ground squirrel (*C. beldingi*) taken 17½ miles south and 28 miles east of Susanville.
Do	June 20	Pool of fleas from 43 ground squirrels (*C. oregonus*) taken near Janesville
Do	June 25–27	Tissue from 3 ground squirrels (*C. oregonus*) taken near Susanville
Los Angeles County	July 14	Pool of fleas from 13 ground squirrels (*C. beecheyi*) taken 2½ miles south of Gorman.
Do	July 17	Pool of fleas from 24 ground squirrels (*C. fisheri*) collected near Big Pines.
Do	July 21	4 pools of fleas from ground squirrels (*C. fisheri*) taken near Big Pines.
Do	July 22	2 pools of fleas from ground squirrels (*C. fisheri*) and wood rats taken near Big Pines
Do	July 23	Pool of fleas from 14 ground squirrels (*C. fisheri*) taken near Big Pines, and a pool of fleas from 17 ground squirrels (*C. beecheyi*) and tissue from 1 squirrel (same sp.) caught 1 mile west of Gorman
Do	July 24	Pool of fleas from ground squirrels (*C. fisheri*) taken near Big Pines
Do	July 27	Pool of fleas from 4 ground squirrels (*C. beecheyi*) taken ½ mile south of Ridge Tavern.
Do	July 28	1 tick from 1 jack rabbit taken 9 miles west of Fairmont.
Marin County	Sept. 15–18	5 pools of fleas from mice (*M. californicus* and *M. peromyscus truei*) and 1 pool of fleas from 17 rats (*R. norvegicus*) taken at Fort Cronkhite
Do	Sept. 16–18	3 pools of fleas from rats (*R. norvegicus*) and 1 pool of fleas from mice taken at Camp Mendell
Do	Sept. 16–17	Pool of fleas from 4 rats and pool of lice from 3 rats (all *R. norvegicus*) taken at Fort Baker
Modoc County	May 22	Pool of fleas from 72 ground squirrels (*C. oregonus*) collected 1 mile west of Gamby.
Do	July 3	Tissue from 1 ground squirrel (*C. oregonus*) and 1 pool of fleas from 16 chipmunks taken in Modoc National Forest, 9 miles west of Likely.
Mono County	Sept. 4	3 pools of fleas from ground squirrels (*C. beldingi*, *C. fisheri*, and *C. lateralis*) and 1 pool of fleas from 27 chipmunks taken near Mammoth.
Do	Sept. 8	3 pools of fleas from ground squirrels (*C. beldingi* and *C. lateralis*) and 1 pool of fleas from 23 chipmunks taken near Mammoth.
Do	Sept. 9	Pool of fleas from 22 chipmunks collected near Mammoth and tissue from 1 chipmunk found dead 1 mile east and 4 miles south of June Lake.
Do	Sept. 21	Pool of fleas from 16 golden mantled ground squirrels collected near Mammoth.
Monterey County	Mar. 20	2 pools of fleas from 7 mice (*Peromyscus truei*) and 1 brush rabbit (*Sylvilagus bachmanii*) taken near Bradley Road.
Do	Apr. 28	Pool of fleas from 1 ground squirrel (*C. beecheyi*), tissue from 1 ground squirrel (same species), and pool of fleas from 14 wood rats (*Neotoma fuscipes*) taken in Lugo Canyon, west of San Antonio River.
Do	May 5	Tissue from 1 pack rat (*Neotoma fuscipes*) taken in Lugo Canyon.
Do	May 14	Tissue from 5 ground squirrels (*C. beecheyi*) collected 3 miles northwest of Lockwood.
Do	May 15	Tissue from 3 ground squirrels (*C. beecheyi*) collected 3 miles northwest of Lockwood, and 1 pool of fleas from 15 ground squirrels (*C. beldingi*) taken at Ft. Ord Military Reservation, 12 miles southwest of Salinas.
Do	May 20	Organs from 5 wood rats taken 8 miles northeast of Lockwood.
Do	June 2	Tissue from 1 ground squirrel (*C. beecheyi*) taken at the upper end of Lugo Canyon.

***Plague infection in rats, wild rodents, and their ectoparasites reported to the Public Health Service during 1942*—Continued**

State and county	Date	Infection found in—
California—Continued.		
Monterey County	June 3	Pool of fleas from 17 ground squirrels (*C. beecheyi*) collected 12 miles southwest of Salinas (Ft. Ord).
Do	June 13	Tissue from 15 ground squirrels (*C. beecheyi*) taken 12 miles southwest of Salinas.
Do	June 18-20	Pool of fleas from ground squirrel burrows, 7 pools of fleas from ground squirrels, and tissue from 2 squirrels (all squirrels *C. beecheyi*) collected 12 miles southwest of Salinas.
Do	June 22	2 pools of lice and fleas from ground squirrels (*C. beecheyi*) taken 12 miles southwest of Salinas.
Do	June 23	Pool of fleas from ground squirrels (*C. beecheyi*) taken on the Ft. Ord Military Reservation.
Do	June 24	Pool of fleas from ground squirrels (*C. beecheyi*) taken 12 miles southwest of Salinas (Ft. Ord).
Do	June 25	Pool of fleas from 21 ground squirrels (*C. beecheyi*) taken 13 miles southwest of Salinas.
Do	June 26	Pool of fleas from ground squirrels (*C. beecheyi*) taken 6 miles southwest of Salinas, and pool of fleas from ground squirrels collected 12 miles southwest of Salinas.
Do	June 27	Pool of fleas from ground squirrels (*C. beecheyi*) taken at Ft. Ord.
Do	June 30	Pool of fleas from ground squirrels (*C. beecheyi*) taken 6 miles southwest of Salinas.
Do	July 2	Pool of fleas and ticks from wood rats (*Neotoma fuscipes*) taken on the Hunter Liggett Military Reservation.
Do	July 10	Pool of fleas from 30 ground squirrels (*C. beecheyi*) taken 12 miles southwest of Salinas.
Do	July 20	Pool of fleas from ground squirrels (*C. beecheyi*) taken 5½ miles south, 2½ miles west of Salinas.
Do	July 21	Tissue from ground squirrels, ticks from 52 ground squirrels taken 16 miles south of Salinas, and a pool of fleas from 36 ground squirrels taken 20 miles southeast of Monterey. (All squirrels *C. beecheyi*.)
Do	July 22	Pool of fleas, 1 pool of ticks and fleas, and 1 of tissue from ground squirrels (*C. beecheyi*) taken near Salinas.
Do	Aug. 5	2 pools of fleas from ground squirrels and tissue from 1 squirrel (all *C. beecheyi*) taken on the Ft. Ord Reservation.
Do	Aug. 6	3 pools of fleas from ground squirrels and tissue from 2 squirrels (all *C. beecheyi*) taken near Salinas.
Do	Aug. 7	Tissue from 1 ground squirrel, 2 pools of fleas from ground squirrels (*C. beecheyi*), and a pool of ticks from 1 cottontail rabbit taken on the Ft. Ord Military Reservation.
Placer County	June 20	Pool of fleas from 4 chipmunks taken ½ mile north of Tahoe Vista
Do	June 23	Pool of fleas from 7 ground squirrels (*C. beecheyi*) taken 1 mile north of Tahoe City
Riverside County	May 2	Pool of fleas from 12 ground squirrels (*C. fisheri*) taken 6 miles west of Beaumont.
San Bernardino County	Apr. 6	Pool of fleas from 6 desert antelope squirrels (*Ammospermophilus leucurus*) taken at Helendale Airport.
Do	Apr 14	Pool of fleas from 7 desert antelope squirrels (*Ammospermophilus leucurus*) taken 25 miles west and 5 miles north of Needles.
Do	Apr. 15	Pool of fleas from 5 fuzztail squirrels taken 7 miles west and 3 miles north of Needles.
Do	May 15	Pool of fleas from 12 wood rats taken 4 miles west and 2 miles north of Big Bear Lake.
Do	June 29	Pool of fleas from 15 golden mantled ground squirrels collected 1 mile north of Fawnskin P. O
Do	July 16-20	5 pools of fleas from ground squirrels (*C. fisheri*) taken near Wrightwood.
San Diego County	May 4	Pool of fleas from 8 ground squirrels (*C. fisheri*) taken at the Scripps Institute at La Jolla.
San Luis Obispo County	Apr. 24	Pool of fleas from 10 ground squirrels (*C. beecheyi*) taken 3½ miles east of Santa Margarita.
Do	May 21, June 2, 3, 4, and 12.	Pool of fleas from 64 ground squirrels (*C. beecheyi*) taken 2½ miles north, 8 miles east of Santa Maria.
Do	May 27	Pool of fleas from 12 and organs from 9 ground squirrels (*C. beecheyi*) taken near Santa Maria (Alamo Creek area). Organs from 1 jack rabbit (*Lepus californicus*) and organs from 1 gopher taken near Arroyo Grande
Do	May 28	Organs from 1 brush rabbit and 1 ground squirrel (*C. beecheyi*) taken in the Alamo Creek area northeast of Santa Maria.
Do	June 2-4	3 pools of fleas from ground squirrels (*C. beecheyi*) collected 12 miles east and 6 miles south of Arroyo Grande.
Do	June 3-10	3 pools of organs and 1 pool of fleas from ground squirrels (*C. beecheyi*) taken 2½ miles north and 8 miles east of Santa Maria.
Do	June 7	Organs from 10 ground squirrels (*C. beecheyi*) taken 43 miles east of Arroyo Grande, and organs from 13 squirrels (same species) taken near Santa Maria

Plague infection in rats, wild rodents, and their ectoparasites reported to the Public Health Service during 1942—Continued

State and county	Date	Infection found in—
California—Continued.		
San Luis Obispo County	June 9-10	Pool of fleas from 3 ground squirrels and organs from 1 ground squirrel (*C. beecheyi*) taken near Arroyo Grande.
Do	Oct. 7	Tissue from 5 meadow mice taken 5 miles northwest of San Luis Obispo.
San Mateo County	June 8	Pool of fleas from ground squirrels (*C. beecheyi*) taken ½ mile west of Colma.
Do	June 9	2 pools of fleas from ground squirrels (*C. beecheyi*) taken near Skyline Blvd., Alpine District.
Do	June 10	Pool of fleas from 1 ground squirrel (*C. beecheyi*) taken ½ mile east of Atherton.
Do	June 11	Pool of fleas from ground squirrels taken near Brisbane, and 1 pool of lice from 1 ground squirrel taken ½ mile east of Atherton
Do	June 12	Pool of lice from 1 ground squirrel (*C. beecheyi*) taken 2½ miles west of San Bruno.
Do	June 15	Pool of fleas from 1 ground squirrel (*C. beecheyi*) taken 1 mile west of Redwood City.
Santa Barbara County	Apr 29	Pool of fleas from ground squirrel (*C. beecheyi*) taken 10 miles east of Santa Maria.
Do	June 1-7	3 pools of tissue from ground squirrels (*C. beecheyi*) taken near Santa Maria
Do	June 4-11	3 pools of fleas from ground squirrels (*C. beecheyi*) taken near Santa Maria.
Do	June 8	Pool of fleas from ground squirrels (*C. beecheyi*) taken 9 miles south of Casmalia
Santa Clara County	Apr. 7	2 pools of fleas from ground squirrels (*C beecheyi*) taken near Calero Dam.
Do	Apr. 8	3 pools of fleas from ground squirrels (*C. beecheyi*) taken near Morgan Hill.
Do	Apr 9	Pool of fleas from ground squirrels (*C. beecheyi*) taken 2 miles north and 3 miles west of Gilroy
Do	Apr. 10	Pool of fleas from ground squirrels (*C. beecheyi*) taken near Calero Dam.
Do	July 31	Tissue from 5 ground squirrels (*C. beecheyi*) taken near Calaveras Dam
Siskiyou County	May 27-29	4 pools of fleas from ground squirrels (*C. douglasii*) taken near Montague and 1 pool of fleas from ground squirrels taken near Yreka.
Do	June 3	1 specimen of tissue from 7 and a pool of fleas from 7 ground squirrels (*C. douglasii*) taken 4 miles north of Montague.
Do	June 4	Pool of fleas from golden mantled ground squirrels taken near Grass Lake, 22 miles north of Weed.
Do	June 5	Pool of fleas from field mice and 1 pool of fleas from ground squirrels (*C. douglasii*) taken near Montague, and a specimen of tissue from ground squirrels (*C. douglasii*) taken 1½ miles south of Yreka.
Do	June 8	Pool of fleas from ground squirrels (*C. douglasii*) taken 9 miles northeast of Ager.
Do	June 10	2 pools of fleas from ground squirrels taken 6-7 miles east of Grenada and 1 pool of fleas from ground squirrels taken 6 miles south of Yreka.
Do	June 11	Pool of fleas from ground squirrels (*C. douglasii*) taken ½ mile north of Hilt.
Do	June 12	3 pools of fleas from ground squirrels (*C. douglasii*) taken near Yreka
Do	June 17	Pool of fleas from ground squirrels taken near Montague Airport, 1 pool of fleas from ground squirrels taken 4 miles east of Yreka, and 1 pool of fleas from ground squirrels (*C. douglasii*) taken 12 miles north of Weed.
Do	July 30	Pool of fleas from ground squirrels (*C. douglasii*) taken 5 miles east of Callahan.
Do	July 31	Pool of fleas from ground squirrels (*C. douglasii*) collected 2 miles south of Etna.
Do	Sept. 14-16	3 pools of fleas from ground squirrels (*C. douglasii*) taken near Gazelle.
Do	Sept. 16	Pool of fleas from ground squirrels (*C. douglasii*) taken 3½ miles south of Grenada.
Do	Sept. 17	Pool of fleas from ground squirrels (*C. douglasii*) taken 12 miles north of Weed.
Do	Sept. 18	2 pools of fleas from ground squirrels (*C. douglasii*) taken near Edgewood.
Ventura County	June 16	2 pools of lice from ground squirrels (*C. beecheyi*) taken 1 mile north of Oxnard.
Do	June 22	Pool of lice from 20 ground squirrels (*C. beecheyi*) taken near Ventura.
Do	June 23	Pool of fleas from ground squirrels (*C. beecheyi*) taken 5 miles northeast of Santa Paula.
Do	June 24	2 pools of ticks from cottontail rabbits taken near Somis and 1 pool of fleas from ground squirrels (*C. beecheyi*) taken near Piru.

Plague infection in rats, wild rodents, and their ectoparasites reported to the Public Health Service during 1942—Continued

State and county	Date	Infection found in—
California—Continued.		
Ventura County	July 2	Pool of fleas from ground squirrels (*C. beecheyi*) taken 8 miles west of Ventura.
Do	Sept. 1	Pool of fleas from 12 ground squirrels (*C. beecheyi*) taken 1 mile north of Seacliff. 8 miles west of Ventura.
Idaho:		
Ada County	May 6	In a pool of fleas from 3 marmots (*Marmota flaviventris*) taken south of Boise.
Do	May 7	Tissue from 2 sick ground squirrels (*C. townsendi mollis*) (also fleas and lice from same), taken southeast of Gowen Field Air Base, Boise. Pool of 50 fleas from ground squirrels (same species) taken southeast of Gowen Field.
Do	May 8	Tissue and fleas from ground squirrels (*C. townsendi*) taken south of Gowen Field.
Canyon County	May 13	Tissue and fleas from 1 ground squirrel (*C. townsendi*) taken north of junction of U. S. Route 30 and State Route 44.
Montana.		
Beaverhead County	July 14	Pool of fleas and ticks from ground squirrels (*C. columbianus*) taken 15 miles northwest of Wisdom. Tissue from 1 ground squirrel (*C. columbianus*) taken 3 miles north of Bighole Battlefield.
Nevada:		
Washoe County	July 10	Tissue from 32 ground squirrels (*C. townsendi*) taken about 20 miles southeast of Doyle, Calif.
Oregon:		
Grant County	May 24	Pool of fleas, lice, and ticks from 83 ground squirrels (*C. oregonus*) taken near Mt. Vernon.
Do	May 25	Tissue from 1 ground squirrel (*C. oregonus*) taken near Mt. Vernon
Do	May 27	Pools of lice and fleas from 90 ground squirrels (*C. oregonus*) taken south of Beech Creek.
Do	May 31	Pool of fleas and lice from 7 marmots (*M. flaviventris*) taken south of Mt. Vernon
Harney County	May 14	Pool of fleas from marmot (*M. flaviventris*) taken southwest of Folly farm.
Do	June 19	Pool of fleas from 161 ground squirrels (*C. oregonus*) taken southeast of French Glen.
Jackson County	Mar. 21	Pool of fleas from 8 ground squirrels (*C. douglasii*) taken in Little Butte Creek area.
Do	Mar. 23	Pool of fleas from 17 ground squirrels (*C. douglasii*) taken 4-9 miles south of Ruch.
Josephine County	Mar. 23	Pool of fleas from 12 ground squirrels (*C. douglasii*) taken near Selma.
Klamath County	Apr. 29	Pool of fleas from 1 ground squirrel (*C. oregonus*) taken at Sprague River
Lake County	May 8	Pool of fleas from marmots (*M. flaviventris*) taken at Albert Lake, north of Valley Falls.
Malheur County	June 6	Pool of fleas from 5 marmots (*M. flaviventris*) taken east of Jordan Valley.
Do	June 8	Pool of fleas from 6 marmots (*M. flaviventris*) taken south of Danner.
Do	June 9	Pool of fleas and lice from 9 ground squirrels (*C. mollis*) taken north of McDermitt
Do	June 10	Pool of fleas from 27 ground squirrels (*C. oregonus*) taken west of Jordan Valley.
Do	July 9	Pool of 2 ticks from 1 western badger (*Taxidea taxus neglecta*) taken southwest of Jordan Valley.
Union County	Apr. 30	Pool of fleas and lice from ground squirrels (*C. oregonus*) taken west of North Powder.
Washington:		
Pierce County:		
Tacoma	Sept. 22 to Dec. 30	16 pools of fleas from rats (*R. norvegicus*).
Do	Oct. 9	Pool of fleas and lice from 53 rats (*R. norvegicus*).
Do	Nov. 25 to Dec. 24	16 specimens of tissue from rats (*R. norvegicus*)
Do	Dec. 16	Pool of fleas from rats (*R. rattus*).
Do	Dec. 18	Pool of fleas from rats (*R. alexandrinus*).

POSITIVE PLAGUE AND TULAREMIA SPECIMENS REPORTED IN CANADA DURING 1942

The following summary of positive findings of plague and tularemia infection in specimens collected in the Provinces of Alberta and British Columbia, Canada, during the 1942 season has been received from Dr. C. P. Brown, Chief, Division of Quarantine, Department of Pensions and National Health:

Plague, Alberta Province.—In 10 pools of fleas and 1 specimen of animal tissue, as follows: 2 pools of fleas taken near Stanmore, 2 near Suffield, 1 pool near Sunnynook, 1 near Youngstown, 1 near Hanna, 3 pools, locality not specified, and in tissue of animal taken near Suffield. All positive tissues and fleas were from ground squirrels (*Citellus richardsonii*).

Tularemia, Alberta Province.—In 4 pools of ticks taken, respectively, near Seven Person's Coulee, Whitla, Bullshead Coulee, and Double Summits, and in tissue from a rabbit taken near Seven Person's Coulee.

"BATTLE STATIONS FOR ALL"

Of interest to public health workers is a new publication of the Office of War Information entitled "Battle Stations for All—The Story of the Fight to Control Living Costs."* This booklet is the story behind the President's seven-point economic stabilization program and its relationship to the current war effort and postwar planning for the general public welfare. While not directly concerned with problems of public health, it presents a clear-cut, unacademic picture of the basic principles underlying the inflationary spiral and its attendant dislocations in the life of a people.

To win the war, to share the war's burdens and hardships democratically, and to win the peace that follows—these aims are set forth as the basic objectives of our civilian economy, a tripod on which rests not only our own domestic welfare but that of our fighting men, our allies, and war sufferers abroad. For this we pay with butter as well as with guns, in things physical and material, "in labor, in blood, and in sweat."

"Battle Stations for All" discusses the significance of the inflationary gap, the need for the control of the cost of living, taxation, savings, payment of debts, the conservation of supplies and husbanding of resources, stabilization of wages and prices, rental ceilings, farm parity, and rationing—including the assurance of an adequate diet, a fair share of fuel, and other items of public necessity.

*Copies may be secured from the Division of Public Inquiries, Office of War Information, Washington, D. C. 128 pp. February 1943.

PROVISIONAL BIRTH, DEATH, AND INFANT MORTALITY RATES FOR 1942

Provisional birth, death, and infant mortality rates for 1942 have recently been issued by the Bureau of the Census. Previous comparisons indicate that while the discrepancy between the provisional and final figures may be significant in some States, the total provisional figures for the reporting States are very close approximations of the final figures.

The crude death rate and the infant death rate for the United States for 1942 were the lowest on record for the registration States. The provisional crude death rate (based on returns from 41 States and the District of Columbia) was 10.3 per 1,000 population, as compared with 10.5 in 1941, the previous low, 10.7 in 1940 and 10.6 in both 1939 and 1938. The provisional infant death rate (based on returns from 39 States and the District of Columbia) was 40.8 per 1,000 live births, as compared with 45.3 (final figures) in 1941, 47.0 in 1940, 48.0 in 1939, 51.0 in 1938, and 99.9 in 1915.

The crude birth rate (based on reports from 41 States and the District of Columbia) in 1942 was 20.7 per 1,000 estimated population, as compared with 18.7 for 1941, 17.9 for 1940, and 17.3 in 1939. The birth rate for 1942 is the highest recorded for the United States since 1926, in which year the rate was the same, 20.7. The lowest rate of record for the birth registration area of the United States, established in 1915, is 16.6, in 1933.

During the first World War, 1914–18, the birth rate declined sharply in most of the belligerent countries. So far, declines of similar magnitude have not been reported in the countries at war, although smaller decreases have occurred. The high birth rate for the United States during 1942 continued during January 1943, the rate for that month for 41 States and the District of Columbia being 22.1 per 1,000 estimated population, as compared with 18.6 for the corresponding month of 1942—an increase of 18.8 percent. If the war continues, however, a pronounced decline in the birth rate may be anticipated.

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

February 28–March 27, 1943

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the Public Health Reports under the section "Prevalence of disease." The table gives the number of cases of these dis-

eases for the 4-week period ended March 27, 1943, the number reported for the corresponding period in 1942, and the median number for the years 1938–42.

DISEASES ABOVE MEDIAN PREVALENCE

Meningococcus meningitis.—The number of cases of menigococcus meningitis rose from 1,677 cases during the preceding 4-week period to 2,272 cases for the 4 weeks ended March 27. The total was almost seven times that for the corresponding period in 1942 and more than eleven times the median figure (201 cases) for the same period in 1938–42. The incidence was the highest on record for this period, the nearest approach to it being in 1929 when 1,257 cases were reported for the period corresponding to the one under consideration.

The table shows, by geographic areas, the number of cases reported for recent weeks in comparison with the experience of the two preceding years and also that of the peak year of 1929. In all regions of the country the current incidence has been considerably in excess of that for recent years. Figures for the current period range from approximately eight times the median in the East North Central and South Central regions to twenty-three times the median in the New England region.

Meningococcus meningitis cases reported by weeks during 1943 with comparative data for the corresponding period in 1942, 1941, and 1929 [1]

Division	Week ended—													
	1943													
	Jan 2	Jan 9	Jan 16	Jan 23	Jan 30	Feb 6	Feb. 13	Feb 20	Feb 27	Mar 6	Mar 13	Mar 20	Mar. 27	Apr 3
All regions:														
1943	187	278	309	354	339	330	446	398	503	556	525	619	572	595
1942	47	45	68	52	65	60	42	84	87	70	88	91	90	111
1941	28	41	38	61	53	48	46	46	44	56	43	53	54	70
1929 [2]	160	213	218	232	268	226	256	196	303	297	332	325	330	326
New England:														
1943	23	35	55	46	50	42	49	60	52	61	56	70	88	59
1942	2	8	7	2	6	5	5	5	14	17	10	12	11	13
1941	2	4	0	1	3	1	3	3	3	2	3	4	4	4
1929	2	5	4	5	7	7	3	2	6	11	9	7	6	11
Middle Atlantic:														
1943	37	54	47	68	57	67	94	92	108	117	104	125	133	145
1942	9	12	10	8	19	17	10	18	16	14	19	29	31	40
1941	2	6	12	9	9	7	13	13	8	11	7	9	15	14
1929	29	46	45	47	66	55	58	51	61	54	68	55	27	79
East North Central:														
1943	21	21	10	34	39	38	26	46	41	44	58	40	57	67
1942	5	5	9	3	4	5	5	3	7	4	9	7	5	5
1941	3	7	3	7	3	5	4	4	2	8	8	7	4	7
1929	40	50	53	36	51	43	49	48	63	78	89	65	123	115
West North Central:														
1943	12	19	35	21	24	27	19	22	34	43	25	38	31	22
1942	3	4	3	2	2	3	3	1	4	2	2	2	2	3
1941	3	0	4	3	0	6	3	3	1	5	2	4	1	2
1929	37	21	31	38	24	32	40	33	46	49	42	63	30	29

See footnotes at end of table.

Meningococcus meningitis cases reported by weeks during 1943 with comparative data for the corresponding period in 1942, 1941, and 1929 [1]—Continued

Division	Week ended— 1943 Jan. 2	Jan. 9	Jan. 16	Jan. 23	Jan. 30	Feb. 6	Feb. 13	Feb. 20	Feb. 27	Mar. 6	Mar. 13	Mar. 20	Mar. 27	Apr. 3
South Atlantic														
1943	29	65	57	68	68	71	116	72	[3] 104	[4] 105	105	159	95	106
1942	10	7	15	12	19	13	7	17	20	14	21	19	20	22
1941	6	10	2	10	19	5	7	7	17	10	8	8	13	21
1929	6	8	6	7	17	6	6	7	7	6	15	13	5	10
East South Central														
1943	12	15	21	24	22	16	35	13	64	45	54	74	53	90
1942	6	2	6	4	7	7	3	3	10	3	6	5	8	6
1941	6	6	4	7	10	14	12	12	8	9	7	8	11	11
1929	1	3	4	1	8	7	6	5	5	2	8	12	6	6
West South Central														
1943	6	14	14	23	21	16	31	18	29	27	45	48	46	29
1942	8	2	8	11	3	7	4	31	10	8	15	11	4	8
1941	4	4	7	10	8	7	2	2	1	8	4	5	4	7
1929	7	25	30	37	35	20	16	10	15	13	18	15	13	18
Mountain:														
1943	19	18	10	16	10	7	17	11	18	[5] 25	20	12	8	6
1942	3	1	4	1	1	2	1	2	3	1	1	1	0	1
1941	0	1	0	1	0	0	1	1	2	0	2	2	0	2
1929 [2]	20	26	34	34	38	35	54	25	61	54	56	41	50	34
Pacific														
1943	28	37	60	54	48	46	59	64	53	89	58	47	61	71
1942	1	4	6	9	4	1	4	4	3	7	5	5	9	13
1941	2	3	6	4	1	3	1	1	2	3	2	6	2	2
1929	18	29	11	27	22	21	24	15	39	30	27	54	70	24

[1] A similar table appeared in Public Health Reports for March 19, 1943, page 494.
[2] Exclusive of Nevada
[3] Delayed report of 19 cases in Virginia included.
[4] Delayed report of 15 cases in Virginia included.
[5] Delayed report of 10 cases in Arizona included.

For the United States as a whole the incidence has exceeded that of the 1929 maximum in each week of 1943. The weekly excess has been particularly marked in the East, with only the North Central and Mountain areas generally showing fewer reported cases than in 1929.

States in which the disease was most prevalent during the current period were New York (235 cases), Pennsylvania (131), New Jersey (113), Massachusetts (116), Maine (47), Rhode Island (83), Virginia (151), Maryland (81), Illinois (63), Missouri (90), North Carolina (76), Mississippi (88), and California (154).

Measles.—The number of cases of measles rose from approximately 59,500 during the preceding 4-week period to 86,596 cases during the current 4-week period. The number was, however, only slightly above the number reported in 1942, which figure (86,298) also represents the 1938–42 median incidence for the corresponding period. The incidence in the Middle Atlantic and East South Central regions was approximately three times the 1938–42 expectancy, while all other regions, except the South Atlantic, reported minor excesses; in the South Atlantic region the number of cases (5,222) was about 40 percent of the seasonal expectancy.

Poliomyelitis.—For the current period there were 92 cases of poliomyelitis reported, as compared with 80 in 1942 and a median of 74 cases for the corresponding period in 1938–42. Of the total cases, Texas reported 16, California 12, and Arizona 5—no more than 4 cases were reported from any other State. The lowest incidence of this disease is usually reached during the month of April.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—During the 4 weeks ended March 27 the incidence of diphtheria (957 cases) was about 25 percent lower than the 1938–42 median level (1,273 cases) for this same period. The number of cases in each geographic region of the country was relatively low.

Influenza.—For the current period there were 17,615 cases of influenza reported, as compared with 18,881, 32,019, and 33,101 cases during the corresponding period in 1942, 1941, and 1940, respectively. The highest incidence was still reported from the South Atlantic and West South Central regions, but in all regions the numbers of cases were considerably below the normal seasonal expectancy.

Scarlet fever.—The incidence of this disease was also relatively low, the 16,477 cases reported for the current 4-week period being only about 80 percent of the preceding 5-year median (20,341) cases. An increase over the median figure of approximately 85 percent was reported in the New England region, with smaller excesses in the South Atlantic and Mountain regions; in all other regions the incidence was comparatively low.

Smallpox.—Ninety cases of smallpox were reported during the 4 weeks ended March 27, as compared with 95 in 1942 and with a median of 309 cases for the corresponding period in 1938–42. Of the total cases, Indiana reported 16, North Carolina 13, Illinois 11, Ohio 10, Arkansas 7, and Nebraska and Oklahoma 5 each. No more than 3 cases were reported from any other State.

Typhoid and paratyphoid fever.—The incidence of this disease continued at the lowest level on record. For the current period the cases dropped below even the previous year, when 262 cases were reported for this period. The 1938–42 median for the period corresponding to the one under consideration was 337 cases. A very favorable situation exists in all sections of the country, the incidence in practically all areas being the lowest on record.

Whooping cough.—The incidence of whooping cough was in line with the number of cases that usually occur at this season of the year, the number (16,081) reported for the current period being only slightly lower than the 1938–42 median for the corresponding period. The Middle Atlantic, North Central, and South Central regions reported more cases than normally occur in those regions; the South Atlantic,

Mountain, and Pacific regions reported fewer cases than might be expected, and in the New England region the disease stood at the normal level.

MORTALITY, ALL CAUSES

For the 4 weeks ended March 27 there was an average of 9,923 deaths in 90 large cities reported to the Bureau of the Census, as compared with an average of 9,154 deaths for the corresponding weeks in the years 1940–42. The current figure represents an increase over the 3-year average of about 7.7 percent. Death rates for these cities will be published when current populations are available from the Bureau of the Census.

Number of reported cases of 9 communicable diseases in the United States during the 4-week period February 28, 1943, to March 27, 1943, the number for the corresponding period in 1942, and the median number of cases reported for the corresponding period, 1938–1942

Division	Current period	1942	5-year median	Current period	1942	5-year median	Current period	1942	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	957	1,175	1,273	17,615	18,831	32,019	86,596	86,298	86,298
New England	10	25	26	35	36	53	8,422	6,153	4,041
Middle Atlantic	140	178	180	110	108	245	25,237	8,552	8,552
East North Central	116	187	211	430	533	1,940	13,903	7,891	7,891
West North Central	79	80	115	183	23.	645	7,641	9,483	6,092
South Atlantic	169	158	256	7,324	6,029	11,085	5,222	13,329	13,329
East South Central	88	156	115	1,213	1,732	2,777	6,189	1,898	1,898
West South Central	204	255	255	6,921	7,302	10,377	4,499	13,274	3,257
Mountain	52	54	76	949	2,019	1,257	6,924	3,807	3,501
Pacific	99	84	107	450	841	1,141	8,469	21,911	6,965
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	2,272	339	201	92	80	74	16,477	18,079	20,341
New England	281	50	12	6	3	1	2,631	1,810	1,406
Middle Atlantic	479	93	44	12	7	7	4,153	5,269	5,405
East North Central	199	25	25	9	14	13	4,203	5,420	7,254
West North Central	137	8	11	5	9	2	1,708	2,005	2,005
South Atlantic	464	74	43	10	10	11	1,082	1,184	1,031
East South Central	226	22	27	7	9	9	541	794	768
West South Central	166	38	19	17	9	10	414	307	429
Mountain	65	3	6	8	6	5	848	552	552
Pacific	255	26	15	18	13	11	897	738	958
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	90	95	309	229	262	337	16,081	15,057	16,456
New England	0	0	0	6	8	11	1,445	1,835	1,465
Middle Atlantic	0	0	0	45	47	47	3,841	3,907	3,632
East North Central	38	18	58	31	29	37	3,383	3,059	3,059
West North Central	12	22	89	10	10	21	794	632	632
South Atlantic	14	2	8	59	66	66	1,972	1,626	2,661
East South Central	5	11	11	13	28	31	666	566	566
West South Central	16	39	98	34	40	47	1,982	838	907
Mountain	3	3	35	7	8	19	501	863	803
Pacific	2	0	18	24	26	26	1,497	1,731	1,731

[1] Mississippi, New York, and Pennsylvania excluded; New York City included.
[2] Mississippi excluded.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 10, 1943

Summary

Of the nine common communicable diseases included in the following tables, and for which earlier comparable figures are available, the incidence of only three—measles, meningitis, and whooping cough—was above the respective 5-year (1938–42) medians, and the incidence of only one—whooping cough—increased as compared with the preceding week.

A total of 587 cases of meningococcus meningitis was reported for the week (exclusive of a delayed report of 19 cases in Oklahoma), as compared with 595 for the preceding week and 572 for the next earlier week. Increases as compared with the preceding week and with the average numbers of cases reported for the past 3 weeks were recorded in the New England, West North Central, West South Central, and Mountain States. An increase was also reported in the South Atlantic States, as compared with the immediately preceding week, but the figures were below the preceding 3-week average. States reporting the largest numbers for the week (the preceding week's figures in parentheses) were as follows: New York, 48 (68); Pennsylvania, 39 (38); Massachusetts, 38 (23); California, 38 (58); Missouri, 33 (12). Virginia, 29 (31); Texas, 29 (20); New Jersey, 28 (39); South Carolina, 25 (15); North Carolina, 20 (18); Idaho, 20 (0). The cumulative total for the first 14 weeks of the year is 6,432, representing an annual rate of 17.9 per 100,000 estimated population, as compared with 3,715 cases and a rate of 11.3 for the first 14 weeks of 1930, the highest incidence for the corresponding period of any year for which comparable records are available (since 1927).

Although meningococcus meningitis is the only one of the important communicable diseases which has assumed epidemic proportions, the incidence of the following diseases for the first 14 weeks (ended April

10) of the current year is slightly above that for the corresponding period of last year: Dysentery (all forms), infectious encephalitis, measles, poliomyelitis, smallpox, endemic typhus fever, and whooping cough. The incidence of typhoid fever has been the lowest on record. A total of 743 cases has been reported to date this year, as compared with 1,043 for the same period last year, and a 5-year median of 1,080.

The number of deaths from all causes recorded for the week in 88 large cities of the United States was 9,464, as compared with 9,715 for the preceding week and a 3-year average of 8,559. The accumulated total for the first 14 weeks of the year is 138,871, as compared with 127,079 for the same period in 1942.

Telegraphic morbidity reports from State health officers for the week ended April 10, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1938-42	Week ended		Median 1938-42	Week ended		Median 1938-42	Week ended		Median 1938-42
	Apr 10, 1943	Apr. 11, 1942		Apr. 10, 1943	Apr. 11, 1942		Apr. 10, 1943	Apr. 11, 1942		Apr. 10, 1943	Apr. 11, 1942	
NEW ENG												
Maine	0	0	1	1	1	4	10	208	208	9	1	0
New Hampshire	0	0	0	-----	-----	------	27	15	29	2	0	0
Vermont	0	0	0	-----	-----	------	430	56	56	1	0	0
Massachusetts	1	3	2	-----	-----	------	1.746	1.158	759	38	5	1
Rhode Island	0	0	0	1	-----	------	14	358	30	16	1	0
Connecticut	0	0	0	4	3	5	341	656	209	13	6	1
MID ATL.												
New York	21	10	18	[1] 13	[1] 10	[1] 13	2.756	633	1,563	48	15	3
New Jersey	10	4	7	19	11	11	1,754	907	907	28	8	1
Pennsylvania	15	10	24	2	------	-	2,041	1,068	1,068	39	15	7
E NO. CEN.												
Ohio	9	5	12	13	8	8	925	376	376	8	0	0
Indiana	4	6	16	19	45	16	226	134	134	8	2	2
Illinois	19	17	22	12	7	16	1,391	758	758	17	6	2
Michigan [2]	5	3	9	34	21	20	1,370	279	409	14	0	0
Wisconsin	3	4	1	40	42	103	1,627	731	731	4	0	1
W NO CEN.												
Minnesota	1	2	2	2	2	2	141	937	227	1	0	0
Iowa	0	14	9	------	1	8	245	221	194	0	0	0
Missouri	0	3	9	2	1	4	623	268	268	33	1	1
North Dakota	0	2	0	11	3	12	120	30	33	2	1	1
South Dakota	1	4	0	-----	----	1	66	4	4	0	0	0
Nebraska	2	6	3	7	28	1	392	305	127	0	0	0
Kansas	3	3	3	5	13	13	797	532	532	2	1	1
SO ATL.												
Delaware	0	0	0	----	1	------	93	8	8	2	0	0
Maryland [3]	2	2	1	3	14	16	91	792	344	18	9	0
Dist. of Col	0	1	1	- --	3	3	57	134	134	7	0	0
Virginia	8	7	10	323	378	378	559	182	438	20	4	3
West Virginia	5	5	8	5	24	58	79	184	184	5	1	1
North Carolina	1	9	15	47	18	22	202	825	825	20	2	1
South Carolina	8	6	6	618	402	415	207	200	200	25	3	1
Georgia	3	3	4	52	73	164	224	161	194	7	1	1
Florida	2	1	6	33	11	6	69	283	283	6	0	0
E. SO. CEN.												
Kentucky	4	6	7	4	4	13	455	87	146	12	3	1
Tennessee	0	5	5	61	48	96	398	129	129	13	1	2
Alabama	7	5	5	198	105	124	118	213	213	12	3	3
Mississippi [3]	0	4	4	---- -	---	- --	-----	------	------	15	1	2
W. SO CEN.												
Arkansas	1	4	4	42	81	131	169	149	149	0	1	1
Louisiana	0	5	5	16	4	11	170	354	94	15	1	1
Oklahoma	2	5	5	89	68	74	66	359	112	[3] 22	2	1
Texas	40	37	30	1,372	726	882	1,150	2,457	890	29	7	3
MOUNTAIN												
Montana	1	3	2	------	8	8	295	76	20	0	0	0
Idaho	3	0	1	---	--	2	318	52	35	20	0	0
Wyoming	0	0	1	19	116	-------	140	72	57	3	1	0
Colorado	14	6	9	38	72	34	356	245	245	6	1	0
New Mexico	1	3	2	2	5	1	22	84	84	0	0	0
Arizona	5	1	2	98	125	125	60	189	.98	0	1	1
Utah [3]	0	0	0	13	26	26	239	286	286	1	0	0
Nevada	0	0	------	------	------	------	24	0	-------	0	0	------
PACIFIC												
Washington	1	2	2	-----	9	2	564	354	354	4	3	1
Oregon	1	0	2	12	16	22	452	156	156	14	0	0
California	16	9	21	74	499	151	1,032	6,341	616	38	5	2
Total	219	225	307	3,304	3,032	3,412	24,651	24,006	24,006	[3] 606	112	65
14 weeks	3,898	4,262	5,213	60,738	64,484	123,386	235,059	228,957	228,957	6,432	1,064	719

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 10, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis: Week ended Apr. 10, 1943	Poliomyelitis: Week ended Apr. 11, 1942	Poliomyelitis: Median 1938–42	Scarlet fever: Week ended Apr. 10, 1943	Scarlet fever: Week ended Apr. 11, 1942	Scarlet fever: Median 1938–42	Smallpox: Week ended Apr. 10, 1943	Smallpox: Week ended Apr. 11, 1942	Smallpox: Median 1938–42	Typhoid and paratyphoid fever: Week ended Apr. 10, 1943	Typhoid and paratyphoid fever: Week ended Apr. 11, 1942	Typhoid and paratyphoid fever: Median 1938–42
NEW ENG.												
Maine	0	0	0	18	8	11	0	0	0	0	1	1
New Hampshire	0	0	0	2	10	7	0	0	0	0	0	0
Vermont	0	0	0	15	13	13	0	0	0	0	0	0
Massachusetts	0	1	0	619	351	220	0	0	0	1	3	1
Rhode Island	0	0	0	24	8	12	0	0	0	0	0	0
Connecticut	0	0	0	93	31	117	0	0	0	2	1	1
MID ATL.												
New York	0	2	2	567	482	662	0	0	0	6	10	6
New Jersey	0	0	0	158	202	202	0	0	0	0	2	3
Pennsylvania	0	2	1	337	421	406	0	0	0	2	7	7
E. NO. CEN.												
Ohio	0	0	1	254	324	361	0	1	1	3	3	3
Indiana	0	0	0	68	108	161	0	1	2	0	0	1
Illinois	3	0	0	180	233	487	0	0	5	3	0	1
Michigan [2]	0	0	0	128	227	365	0	1	1	3	0	3
Wisconsin	0	0	0	343	142	142	1	0	2	0	1	1
W. NO CEN.												
Minnesota	0	0	0	76	80	74	0	0	2	0	0	0
Iowa	1	0	0	41	73	73	1	2	11	0	1	1
Missouri	0	0	0	192	56	111	1	1	1	0	1	1
North Dakota	0	0	0	5	23	15	0	0	1	0	4	1
South Dakota	0	0	0	17	38	18	0	0	2	0	0	0
Nebraska	0	0	0	56	31	31	0	0	3	0	0	0
Kansas	0	0	0	62	109	78	0	0	1	0	0	1
SO ATL.												
Delaware	0	0	0	7	37	8	0	0	0	1	0	0
Maryland [2]	0	0	0	139	82	50	0	0	0	2	2	2
Dist. of Col	0	0	0	26	12	17	0	0	0	0	0	0
Virginia	0	1	1	56	34	49	0	0	0	0	2	2
West Virginia	0	1	1	24	32	49	0	0	0	1	0	1
North Carolina	1	0	0	30	14	31	0	0	0	0	1	1
South Carolina	1	0	0	4	1	3	0	0	0	0	0	0
Georgia	1	0	0	10	16	10	0	0	0	5	2	2
Florida	0	1	1	11	7	7	0	0	0	3	14	5
E. SO CEN.												
Kentucky	1	0	0	43	90	89	0	1	1	1	5	3
Tennessee	0	0	1	35	68	68	4	0	0	2	1	2
Alabama	1	0	0	21	18	12	0	0	0	1	0	2
Mississippi [2]	1	0	1	5	13	6	0	1	1	0	1	2
W. SO. CEN												
Arkansas	0	0	0	6	5	6	6	5	1	0	0	1
Louisiana	0	0	0	8	8	8	0	2	0	4	3	3
Oklahoma	0	0	0	39	13	16	0	0	3	0	2	1
Texas	1	3	2	76	41	60	6	3	3	3	5	7
MOUNTAIN												
Montana	0	0	0	6	5	16	0	0	0	1	1	1
Idaho	1	0	0	61	19	14	0	0	0	0	0	0
Wyoming	0	0	0	60	12	16	0	0	0	0	0	0
Colorado	0	1	0	50	46	38	0	0	1	2	0	2
New Mexico	0	1	0	4	4	6	0	0	0	3	0	1
Arizona	0	0	0	20	4	7	0	0	0	1	0	0
Utah [2]	2	0	0	45	22	22	1	0	0	0	0	0
Nevada	0	0	----	3	0	----	0	0	----	0	0	----
PACIFIC												
Washington	0	0	0	25	65	37	0	0	3	0	1	1
Oregon	0	0	0	33	6	20	0	2	2	0	0	1
California	5	0	1	144	76	124	1	0	2	1	3	3
Total	19	13	23	4,246	3,720	4,468	21	20	49	51	77	78
14 weeks	359	313	313	55,284	55,893	66,711	371	322	1,003	743	1,043	1,080

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 10, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Whooping cough			Week ended April 10, 1943								
	Week ended		Median 1938–42	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	Apr. 10, 1943	Apr. 11, 1942			Amebic	Bacillary	Unspecified					
NEW ENG												
Maine	35	6	61	0	0	0	0	0	0	0	0	0
New Hampshire	0	7	1	0	0	0	0	0	0	0	0	0
Vermont	65	40	31	0	0	0	0	0	0	0	0	0
Massachusetts	149	188	188	0	0	0	0	0	0	0	0	0
Rhode Island	45	48	26	0	0	0	0	0	0	0	0	0
Connecticut	47	89	72	0	0	0	0	0	0	0	0	0
MID. ATL.												
New York	373	419	419	1	7	29	0	2	0	0	0	0
New Jersey	202	314	158	1	0	0	0	2	0	0	0	0
Pennsylvania	289	231	270	0	0	0	0	0	0	0	0	0
E. NO. CEN												
Ohio	155	143	143	0	0	1	0	1	0	0	0	0
Indiana	81	32	21	0	0	0	0	0	0	0	0	0
Illinois	139	194	148	0	0	2	0	3	0	0	0	0
Michigan [3]	216	176	176	0	0	0	0	0	0	0	0	0
Wisconsin	224	132	131	0	0	0	0	0	0	0	0	0
W. NO CEN												
Minnesota	93	45	30	0	1	0	0	0	0	0	0	0
Iowa	24	11	11	0	1	0	0	1	0	0	0	0
Missouri	39	13	33	0	0	0	2	1	0	0	0	0
North Dakota	17	13	13	0	0	0	0	0	0	0	0	0
South Dakota	1	0	5	0	0	0	0	0	0	0	0	0
Nebraska	13	7	8	0	0	0	0	0	0	0	0	0
Kansas	95	34	34	0	1	0	0	0	0	0	1	0
SO. ATL.												
Delaware	3	0	9	0	0	0	0	0	0	0	0	0
Maryland [2]	111	25	59	0	0	0	0	0	0	1	0	0
Dist. of Col.	26	14	14	0	0	0	0	0	0	0	0	0
Virginia	77	48	51	0	0	0	21	0	0	0	0	0
West Virginia	42	20	44	0	0	0	0	0	0	0	0	0
North Carolina	189	96	263	0	0	0	0	0	0	0	0	5
South Carolina	46	55	55	0	0	0	0	0	0	0	1	0
Georgia	91	28	28	0	0	0	0	0	0	0	2	6
Florida	42	13	19	0	1	1	0	0	0	0	0	3
E. SO. CEN.												
Kentucky	50	59	59	0	0	0	0	0	0	0	0	0
Tennessee	67	41	42	0	0	0	1	1	0	0	0	0
Alabama	52	20	23	0	0	0	0	0	0	0	0	12
Mississippi [2]	------	--	------	0	0	0	0	0	0	0	4	0
W. SO. CEN.												
Arkansas	9	8	33	0	0	0	0	0	0	0	1	0
Louisiana	18	11	5	0	1	0	0	0	0	0	0	3
Oklahoma	45	8	10	0	0	0	0	0	0	0	0	0
Texas	697	188	263	0	6	154	0	2	0	0	3	12
MOUNTAIN												
Montana	11	11	11	0	0	0	0	0	0	0	0	0
Idaho	0	0	8	0	0	0	0	0	0	0	0	0
Wyoming	2	8	3	0	0	0	0	0	0	0	0	0
Colorado	19	47	47	0	1	0	0	0	0	0	0	0
New Mexico	7	45	26	0	0	0	0	0	0	0	0	0
Arizona	35	46	38	0	0	0	26	0	0	0	0	0
Utah [2]	46	32	39	0	0	0	0	0	0	0	2	0
Nevada	0	12	------	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	34	96	96	0	0	0	0	0	0	0	0	0
Oregon	19	34	25	0	0	0	0	0	0	0	0	0
California	416	286	372	0	3	7	0	1	2	0	0	1
Total	4,456	3,393	3,562	2	22	194	50	14	2	1	14	42
14 weeks	55,880	54,101	58,168	22	405	2,796	596	155	7	5	245	679

[1] New York City only. [2] Period ended earlier than Saturday. [3] Delayed report of 19 cases included.

WEEKLY REPORTS FROM CITIES

City reports for week ended March 27, 1943

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga	0	0	15	3	34	0	2	0	3	0	0	[illegible]
Baltimore, Md	2	0	3	0	58	15	15	0	51	0	0	6[illegible]
Billings, Mont	0	0	---	0	1	0	0	0	2	0	0	[illegible]
Birmingham, Ala	3	0	4	0	9	0	3	0	3	0	0	
Boise, Idaho	0	0	---	0	0	0	0	0	0	0	0	[illegible]
Boston, Mass	0	0	---	1	210	16	20	0	225	0	0	3[illegible]
Bridgeport, Conn	0	[illegible]	---	0	1	2	4	0	1	0	0	[illegible]
Brunswick, Ga	0	0	---	0	5	1	0	0	0	0	0	[illegible]
Buffalo, N. Y	0	0	1	1	135	2	16	0	15	0	0	[illegible]
Camden, N. J	2	0	2	1	53	0	3	0	1	0	0	[illegible]
Charleston, S. C	0	0	13	1	0	1	3	0	1	0	0	[illegible]
Charleston, W. Va	0	0	3	0	0	0	0	0	1	0	0	[illegible]
Chicago, Ill	9	0	7	3	586	8	34	0	67	0	1	6[illegible]
Cincinnati, Ohio	2	0		0	174	0	3	0	42	0	0	
Cleveland, Ohio	0	0	6	1	14	1	12	0	71	0	0	6[illegible]
Columbus, Ohio	0	0	---	0	22	1	5	0	15	0	0	[illegible]
Concord, N. H	0	0	---	0	0	0	0	0	0	0	0	[illegible]
Cumberland, Md	0	0		0	0	0	1	0	1	0	0	[illegible]
Dallas, Tex	0	0	3	3	6	1	5	0	5	0	0	2[illegible]
Denver, Colo	9	0	7	0	572	0	4	0	7	0	0	[illegible]
Detroit, Mich	0	0	4	3	381	9	30	0	39	0	1	9[illegible]
Duluth, Minn	0	0	---	0	4	0	2	0	3	0	0	[illegible]
Fall River, Mass	0	0	---	0	51	2	5	0	1	0	0	1[illegible]
Fargo, N. Dak	0	0	---	0	1	0	0	0	2	0	0	[illegible]
Flint, Mich	0	0	---	0	24	0	6	0	2	0	0	1[illegible]
Fort Wayne, Ind	0	0	---	0	3	0	3	0	12	0	0	[illegible]
Frederick, Md	0	1	---	0	0	0	0	0	1	0	0	[illegible]
Galveston, Tex	0	0	---	0	2	0	3	0	1	0	0	[illegible]
Grand Rapids, Mich	0	0	---	0	7	0	1	0	5	0	0	2[illegible]
Great Falls, Mont	0	0	---	0	35	0	1	0	3	0	0	[illegible]
Hartford, Conn	0	0	---	0	36	0	1	0	1	0	0	[illegible]
Helena, Mont	0	0	---	0	110	0	0	0	2	0	0	[illegible]
Houston, Tex	0	0	---	1	12	0	9	0	1	0	1	[illegible]
Indianapolis, Ind	0	0	---	0	225	0	12	0	26	0	0	1[illegible]
Kansas City, Mo	1	0	---	2	98	1	5	0	44	0	1	[illegible]
Kenosha, Wis	0	0		0	0	0	1	0	1	0	0	[illegible]
Little Rock, Ark	0	0	2	0	11	1	9	0	2	0	0	
Los Angeles, Calif	4	0	17	0	135	5	10	0	21	0	1	6[illegible]
Lynchburg, Va	0	0	---	0	1	1	0	0	0	0	0	[illegible]
Memphis, Tenn	0	0	---	1	116	1	3	0	4	0	0	2[illegible]
Milwaukee, Wis	0	0	---	0	351	2	2	0	138	0	0	3[illegible]
Minneapolis, Minn	0	0	---	0	50	3	6	0	11	0	0	[illegible]
Missoula, Mont	0	0	---	0	1	0	1	0	1	0	0	[illegible]
Mobile, Ala	0	0	---	2	2	0	0	0	0	0	0	[illegible]
Nashville, Tenn	0	0	---	0	65	0	2	0	0	0	0	[illegible]
Newark, N. J	0	0	1	0	153	4	5	0	14	0	0	1[illegible]
New Haven, Conn	0	0	1	0	3	0	1	0	2	0	0	[illegible]
New Orleans, La	0	0	2	1	81	6	12	0	6	0	0	1[illegible]
New York, N. Y	20	0	12	3	609	35	93	0	394	0	2	5[illegible]
Omaha, Nebr	0	0		0	8	0	7	0	9	0	0	2[illegible]
Philadelphia, Pa	2	0	2	3	656	16	32	0	124	0	0	8[illegible]
Pittsburgh, Pa	1	0	3	1	21	5	15	0	9	0	0	4[illegible]
Portland, Me	0	0	---	0	1	10	9	0	0	0	0	[illegible]
Providence, R. I	0	0	2	0	2	14	8	0	5	0	0	41
Pueblo, Colo	0	0	---	0	7	0	2	0	1	0	0	6[illegible]
Racine, Wis	0	0	---	0	8	0	0	0	16	0	0	1[illegible]
Reading, Pa	0	0	---	1	194	0	1	0	0	0	0	[illegible]
Richmond, Va	0	0	---	0	21	2	4	0	2	0	0	[illegible]
Roanoke, Va	0	0	---	0	1	2	1	0	0	0	0	[illegible]
Rochester, N. Y	0	0	---	0	43	1	7	0	15	0	0	31
Sacramento, Calif	2	0	1	0	8	0	1	0	3	0	0	[illegible]
Saint Joseph, Mo	0	0	---	0	3	1	1	0	0	0	0	[illegible]
Saint Louis, Mo	1	0	3	1	52	11	15	0	22	0	0	2[illegible]

City reports for week ended March 27, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
Saint Paul, Minn.	0	0	------	1	18	1	8	0	1	0	0	54
Salt Lake City, Utah	1	0	------	0	199	1	2	0	14	0	0	25
San Antonio, Tex	4	0	1	1	13	0	5	1	0	0	0	2
San Francisco, Calif	1	0	4	0	121	5	11	0	29	0	0	31
Savannah, Ga	0	0	9	0	4	1	5	0	1	0	0	0
Seattle, Wash	3	0	------	2	127	1	9	2	2	0	0	5
Shreveport, La	0	0	------	0	0	1	3	0	0	0	0	0
South Bend, Ind	0	0	------	0	13	0	0	0	2	0	0	0
Spokane, Wash	0	0	1	1	146	1	2	0	3	0	0	5
Springfield, Mass	0	0	------	0	3	0	0	0	103	0	0	0
Superior, Wis	0	0	------	0	0	0	0	0	3	0	0	1
Syracuse, N. Y	0	0	------	0	49	0	1	0	6	0	0	27
Tacoma, Wash	1	0	------	0	13	0	0	0	2	0	0	0
Tampa, Fla	0	0	1	1	5	0	2	0	2	0	0	1
Terre Haute, Ind	0	0	------	0	3	0	7	0	2	0	0	0
Topeka, Kans	0	0	------	0	301	0	3	0	3	0	0	8
Trenton, N J	0	0	------	0	113	0	0	0	7	0	0	2
Washington, D. C	0	0	1	0	91	6	13	0	20	0	0	33
Wheeling, W. Va	0	0	------	0	3	0	4	0	1	0	0	0
Wichita, Kans	0	0	------	0	93	0	4	0	2	0	0	7
Wilmington, Del	0	0	------	0	67	0	5	0	3	0	0	0
Wilmington, N. C	0	0	------	5	20	1	0	0	2	0	0	6
Winston-Salem, N C	0	0	------	0	3	0	1	0	1	0	0	27
Worcester, Mass	0	0	------	0	372	1	3	0	7	0	0	2
Total	68	1	131	44	7,249	199	542	3	1,676	0	7	1,173
Corresponding week 1942	78	0	167	45	4,974	49	534	4	1,647	1	13	1,130
Average, 1938–42	88	------	381	[1] 51	[2] 5,109	------	[1] 495	------	1,671	13	21	1,099

Dysentery, amebic.—Cases: Atlanta, 1; Boston, 1; Chicago, 1; Memphis, 1; New York, 16

Dysentery, bacillary.—Cases. Baltimore, 1, Los Angeles, 1; Memphis, 2, New York, 2; Richmond, 1; St. Louis, 1.

Dysentery, unspecified—Cases San Antonio, 2.

Typhus fever.—Cases: Birmingham, 1, New Haven, 1; New Orleans, 1; Savannah, 3; Tampa, 2.

[1] 3-year average, 1940-42.
[2] 5-year median

PLAGUE INFECTION IN TACOMA, WASH.

Plague infection has been reported proved in tissue and pools of fleas from rats, *R. norvegicus*, taken in frame buildings in industrial and commercial areas and one residential section of Tacoma, Wash., as follows: March 8, 8 fleas from 4 rats taken in a residential section; March 10, a pool of tissue from 5 rats and a pool of 10 fleas from 3 rats; March 12, 14 fleas from 7 rats; March 15, tissue from 1 rat; March 19, 15 fleas from 2 rats.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (*human*).—On March 28, 1943, one death from bubonic plague in a 9-year-old child was reported in Honokaa, Hamakua District, Island of Hawaii, T. H.

Plague (*rodent*).—During the week ended March 20, 1943, 15 rats proved positive for plague were reported in Hamakua District, Island of Hawaii, T. H., as follows: 6 rats in Honokaa area, 7 rats in Paauhau area, and 2 rats in Kapulena area.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 13, 1943.—During the week ended March 13, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		14	1	120	233	29	11	15	44	467
Diphtheria	1	16	15	27	3	9		3	1	75
Dysentery (bacillary)				9						9
Encephalitis (infectious)						1				1
German measles		2		28	29	1	5	3		68
Influenza		26	14		44	13	18		137	252
Measles		55	7	230	353	53	234	26	114	1,072
Meningitis, meningococcus			1	2	3		1			7
Mumps	1	158	1	47	1,189	162	116		164	1,838
Poliomyelitis					1					1
Scarlet fever		17	13	68	193	40	39	17	19	406
Tuberculosis (all forms)	1	7	7	101	53	5		2	23	220
Typhoid and paratyphoid fever		1		37	1					39
Undulant fever		1						1		2
Whooping cough				107	112	47	5	50	35	356

CUBA

Habana—Communicable diseases—4 weeks ended March 6, 1943.—During the 4 weeks ended March 6, 1943, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	29		Paratyphoid fever	2	
Leprosy	1		Tetanus	1	1
Malaria	3		Tuberculosis	4	1
Measles	11		Typhoid fever	42	3

Public Health Reports

VOLUME 58 APRIL 23, 1943 NUMBER 17

IN THIS ISSUE

Whooping Cough Morbidity and Mortality Rates

Sickness and Absenteeism, Final Quarter of 1942

CONTENTS

Public Health Reports

Vol. 58 • APRIL 23, 1943 • *No. 17*

REPORTED WHOOPING COUGH MORBIDITY AND MORTALITY IN THE UNITED STATES

By C. C. DAUER, *Epidemiologist, District of Columbia Health Department*

Although whooping cough has always been known to be an especially fatal disease in the very young it has not claimed as much attention as some of the other acute infectious diseases of childhood. Its relative importance as a cause of death at the present time may be judged by the fact that it causes more deaths in children under 2 years of age than any other acute infection with the exception of pneumonia and the diarrheas.

Mortality data on this disease are available for States and cities in the United States for variable periods of time depending on the year when the various political units were admitted to the Registration Area. In a few instances morbidity records are available for certain States and cities since 1910, and for the entire country with the exception of two States since 1925. Prior to these dates the disease was not listed as reportable in most States.

The sources of statistical data used in this report were varied. Mortality data were obtained from published and unpublished reports of the Division of Vital Statistics, Bureau of the Census, Washington, D. C. Morbidity data were obtained either from published reports of the various States or from supplements to Public Health Reports on notifiable diseases. All morbidity data are compilations of reported cases in the various States, the completeness of which apparently varies widely.

Trend of mortality and morbidity.—The general trend of mortality from whooping cough in the United States since 1900 may be estimated by the trend for the Registration States of 1900. During the 5-year period from 1900 the mortality was 10. 2 per 100,000 population and during the next two decades there was a decline of about 20 percent, the rate for the period from 1920 to 1924, inclusive, being 8.1. Beginning about 1925 mortality from whooping cough began to decline rapidly so that the rate for the 5-year period from 1935 to 1939 was only 1.8, a decline of about 80 percent in 15 years.

The reason for this marked decline in mortality from whooping cough since 1900 is not apparent. It does not appear to be due to a change in ascribing deaths from this cause to bronchopneumonia. During the period from 1920 to 1939 mortality rates from bronchopneumonia among persons under 5 years of age showed a decline nearly equal to that from whooping cough. For instance, in Massachusetts there was a decline of approximately 60 percent in mortality from bronchopneumonia in this age group while it amounted to 80 percent in Connecticut.

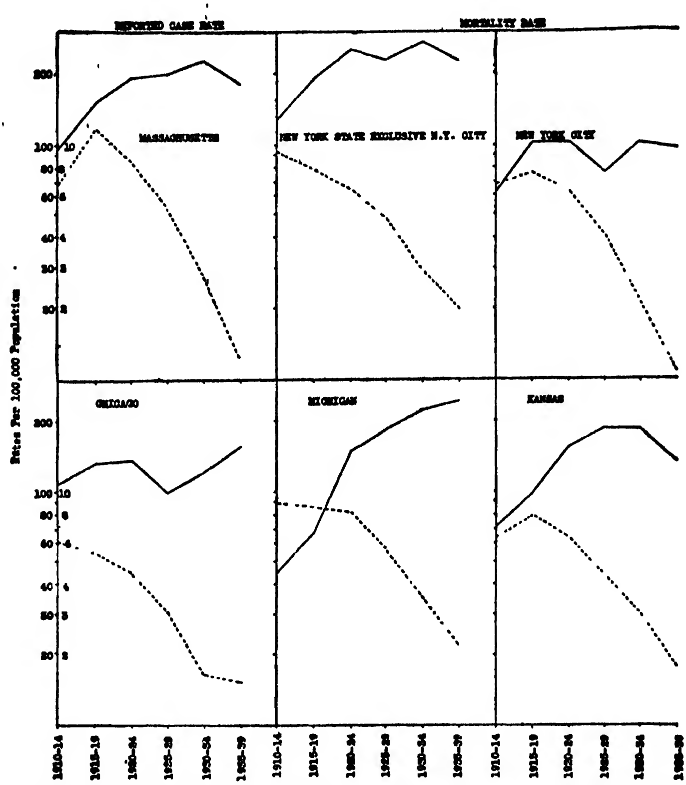


FIGURE 1.—Reported case and mortality rates in certain States and cities, 1910–1939

The general trend of morbidity and mortality in certain States and cities for which data are available continuously since 1910 is shown in figure 1 and in table 1 of the appendix. During the 30-year period from 1910 to 1939 morbidity rates increased; undoubtedly this trend was due principally to more complete reporting of cases rather than to an actual increase in incidence of the disease. On the other hand the trend of mortality for this same group of States and cities was in the opposite direction, that is, a decline which was approximately equal to that of the Registration States of 1900. The number of

cases per death gradually increased over this same period from an average of about 10 cases per death in 1910 to approximately 100 in the 5-year period from 1935 to 1939.

Regional differences in morbidity and mortality.—Morbidity and mortality rates for all sections of the country are shown by States in table 2 of the appendix for three 5-year periods from 1925 to 1939. In many States there has been an increase in morbidity rates and at the same time a substantial decrease in mortality. However, there have been wide differences in both reported morbidity and mortality when certain sections of the country are compared with others. Differences among States of the same region also were found. For instance, the mortality rates were higher in the South Atlantic, East and West South Central, and Mountain States than in other sections. Among the Mountain States there has been a wide variation in mortality; the rates for New Mexico and Arizona have on the average been twice as high as for other States of that section. Morbidity rates have shown even more variation in the different sections of the country, which probably is due in part to wide variations in completeness of reporting. The number of cases reported per death have shown equally wide variations, in general a greater number being reported in States with relatively low mortality rates such as in the northeastern section of the country and in the Pacific States.

A more detailed picture of the regional differences in mortality from whooping cough may be gained by studying its distribution by counties as illustrated in the accompanying map (fig. 2). When calculating the mortality rates for the individual counties for the 5-year period from 1935 to 1939, the total number of deaths and the population under 5 years of age (1940 census) were used. Since the number of deaths by specific age groups is not available for individual counties, and because 95 to 98 percent of all deaths from whooping cough are in children under 5 years of age, the above method of calculating rates was considered to be the best method of showing regional differences in mortality.

During the period from 1935 to 1939, inclusive, the mortality rate from whooping cough calculated on the basis described above was 45 for the country as a whole. The accompanying map shows that most of the counties with high mortality rates, 75 or more, were located in the Southern and Mountain States. A total of 471, or 15 percent, of all the counties in the United States had rates of 75 or more. However, in 107 of the 471 counties the average number of deaths per year was less than one, and the population was 1,000 or less. One-half of the 107 counties were located in the North Central and Mountain States where a fairly large number of counties have small populations. The high rates in this large number of counties are not without some significance.

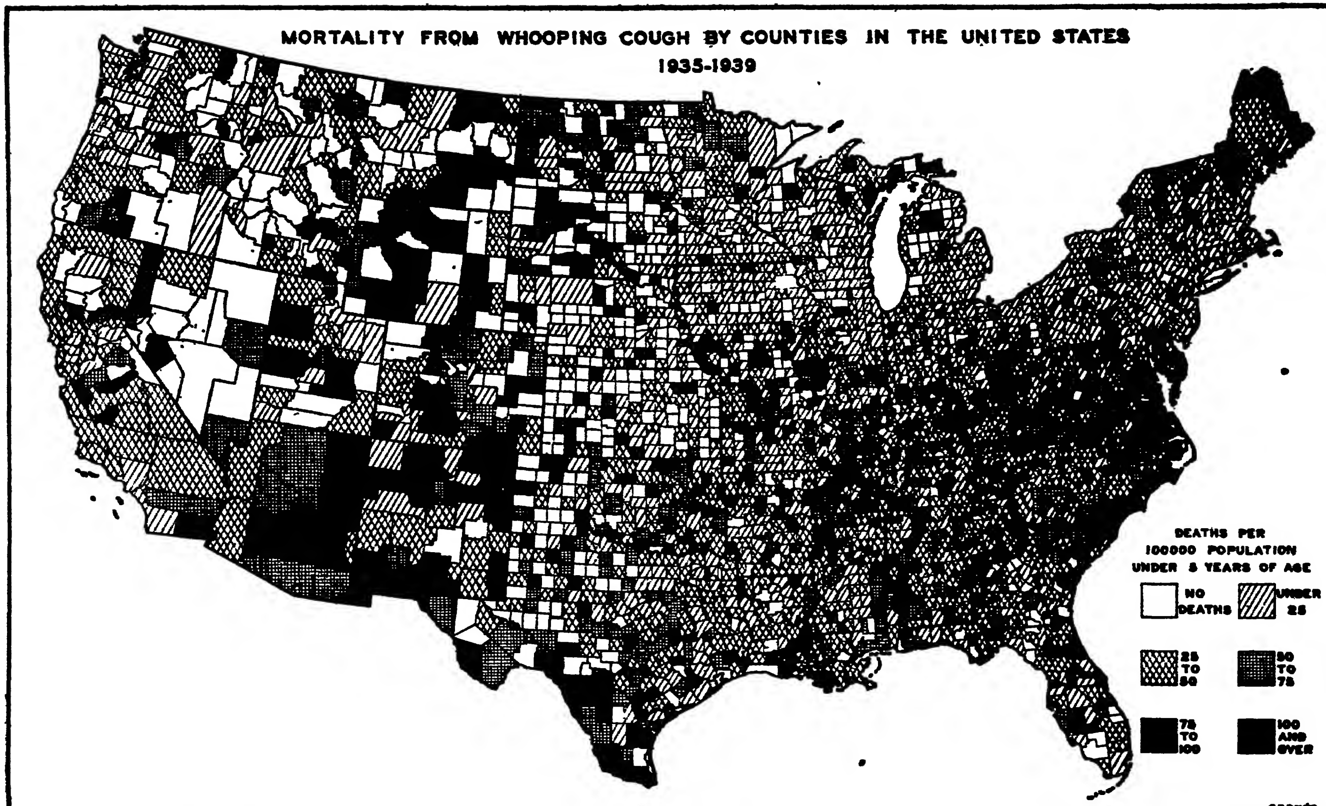

MORTALITY FROM WHOOPING COUGH BY COUNTIES IN THE UNITED STATES
1935-1939
DEATHS PER
100000 POPULATION
UNDER 5 YEARS OF AGE
NO DEATHS
UNDER 25
25 TO 50
50 TO 75
75 TO 100
100 AND OVER

FIGURE 2.

The 364 counties which had an average of one or more deaths per year and rates of 75 or more were concentrated in the South Atlantic, South Central, and Mountain States. The population of these counties is predominantly rural in character. Only two counties contained cities of 100,000 population or more—Charleston County, S. C. (Charleston City), and Henrico County, Va. (Richmond City). A more detailed consideration of the relationship between mortality from whooping cough and rural population will be found later in this report.

Morbidity and mortality by age groups.—The study of whooping cough morbidity by age groups is handicapped by a number of deficiencies in available data. In the first place only a few States publish or have available numbers of cases reported by single years under the age of 5 or 10. Still fewer States have data available over a period of years which would make it possible to determine whether or not there has been any change in the age distribution of cases. The data from certain States are unduly weighted by case reports from the larger cities which make it difficult to draw any conclusions regarding the real age distribution of cases for the State as a whole. Still other reports show a fairly large proportion of cases whose ages are classified as unknown. However, Fales (*1*) has expressed the opinion that there was no reason for supposing that the distribution of these cases of unknown age was any different from the group of known age.

In spite of these deficiencies the available data as shown in figure 3 and table 3 of the appendix suggest that there are fairly wide differences in age distribution of cases in different sections of the country and that changes have occurred in certain sections during the past 15 to 20 years.

The age distribution of cases in the New England and Middle Atlantic States in recent years has been different from that in southern States. For the years 1935 to 1939, inclusive, a larger percentage of cases were in children under 5 years of age in Alabama, Tennessee, Maryland, and Virginia, than was the case in Connecticut, Massachusetts, New Jersey, and New York State, exclusive of New York City. The distribution for Minnesota is similar to that for the northeastern States while that for Colorado resembles the distribution in southern States. In the States for which reports are available on the number of cases by single years under the age of 10 the largest number reported in any one year also varies in the North and South. In Connecticut, Massachusetts, and New York, exclusive of New York City, the greatest number were reported in the sixth year while in Alabama the number under 1 year of age was largest. While the largest number of white cases was in the 6-year group in Virginia the greater concentration of cases under 5 years of age is consistent with the data for other southern States for which there are records. The

age distribution of reported cases among Negroes shows a very marked concentration in the first 2 years, and especially in infants under 1 year. However, reporting of cases appears to be very incomplete for the Negro population; consequently the preponderance of reported cases in the very young may be misleading.

Other infectious diseases common in childhood such as diphtheria, poliomyelitis, and scarlet fever show similar geographical differences in age distribution of cases. These diseases, like whooping cough, are more frequently encountered in children under 5 years of age in southern than in northern States.

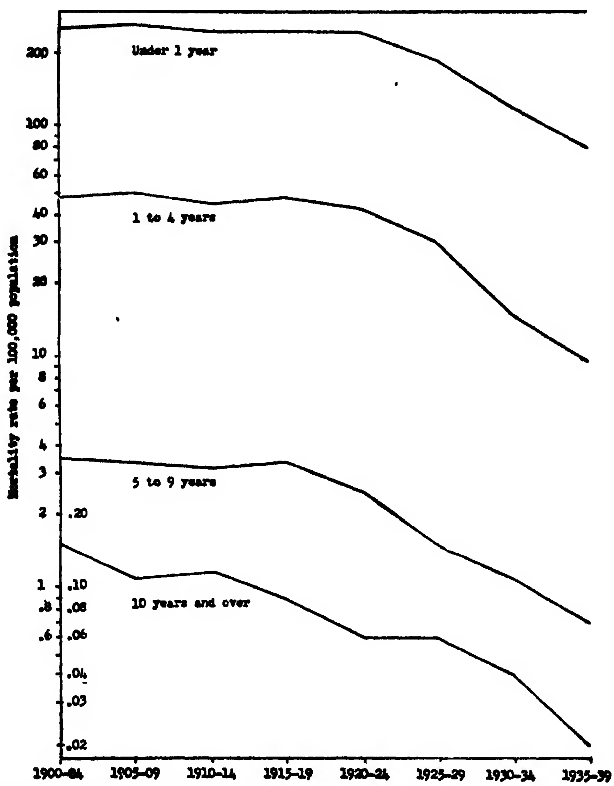


FIGURE 3.—Whooping cough mortality rates in the Registration States of 1900 by age groups, 1900–1939.

It also appears that there has been some shift in the age distribution of reported cases in certain parts of the country. Prior to 1925 the largest number reported was among children 3 years of age in such States as Connecticut, Massachusetts, and New York. In the 5-year period from 1935 to 1939 the greatest number reported in these northern States was in the sixth year. The ratio of the total number of reported cases under 5 years of age to the total in the 5- to 9-year group was 1.4:1.0 prior to 1925 in these States. In other words, the number

under 5 years of age was 40 percent greater than the number 5 to 9 years. In the 5-year period from 1935 to 1939 the ratio had changed so that approximately the same number of cases was reported in each age group. However, the ratio of case rates under 5 years of age to those 5 to 9 years showed less change over the same period of time. The ratio prior to 1925 was 1.3:1.0 and in 1935 to 1939, inclusive, it was 1.1:1.0. This would seem to suggest that changes in the age composition of the population were partially responsible for a shift in the age distribution of reported cases of whooping cough. Data for the State of Alabama from 1925 to 1939 show comparatively little change in age distribution of reported cases or in morbidity rates among white persons. The data for Maryland seem to indicate changes midway between those for Connecticut and Massachusetts on the one hand and Alabama on the other.

Whooping cough mortality data by age groups are available for a much larger proportion of the population of the United States and over a longer period of time than morbidity statistics. Mortality data undoubtedly are much more completely recorded than morbidity figures.

In table 4 of the appendix the percentage distribution of deaths from whooping cough by certain age groups in the various geographical divisions of the country is shown for the period from 1935 to 1939, inclusive. There was no marked variation in percentage of deaths for the different groups under 15 years of age in the various sections except for a slightly lower percentage of deaths in the colored under 6 months of age as compared with the white. However, the proportion of deaths in children under 1 year of age has been approximately the same for both racial groups. The concentration of deaths in the first 2 years of life, especially under 6 months, is constant for all parts of the United States. No other acute communicable disease of childhood, except pneumonia and the diarrheas, shows such a marked concentration in the early years of life.

Some change has taken place in the percentage distribution of deaths in the various age groups during the past four decades. The proportion of deaths in infants under 1 year of age in the Registration States of 1900 increased from slightly more than one-half to approximately two-thirds of the total during the period from 1900 to 1939, inclusive. This shift in age distribution of deaths from whooping cough is exactly opposite that of cases, which, as stated above, is probably due in part to a change in age composition of the population.

The trend of mortality from whooping cough since 1900 has been progressively downward. In the Registration States of 1900 the greatest rate of decline, 87.5 percent, has taken place in the population 10 years of age and over. The 5- to 9- and 1- to 4-year groups experi-

enced nearly the same decrease, namely 80 percent. Under 1 year of age mortality showed a decline of 70.5 percent. As shown in figure 4 the rates have been declining steadily since 1900 in the group 10 years of age and over, while in the 5- to 9- and 1- to 4-year groups the decrease in mortality began about 1920. Not until 1925 was there any appreciable decline in mortality under 1 year of age. Since 1925 the rate of decline has been of the same order in all of the age groups.

Table 5 in the appendix shows the mortality rates by age groups for each State for three 5-year periods from 1925 to 1939. Nearly all

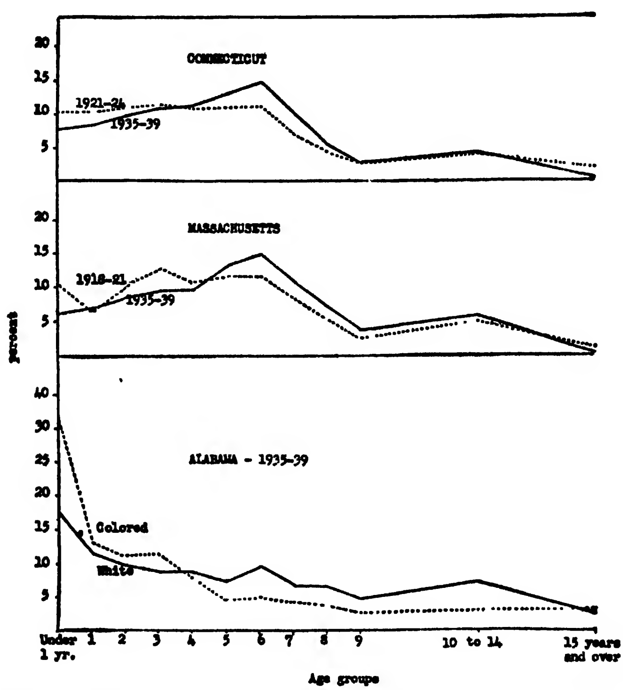


FIGURE 4.—Percentage distribution of reported cases of whooping cough in Connecticut, Massachusetts, and Alabama by age groups.

States have shown a fairly consistent decrease in mortality in the various age groups. Within the various sections there was some difference in mortality in the different groups but the rates in the southern and Mountain States were on the average much higher than those in other parts of the country. The lowest mortality occurred in the Middle Atlantic and Pacific States. Mortality was twice as high among colored persons as for white under 1 year and 5 to 9 years of age, and about three times higher in the 1- to 4-year group.

Sex differences in whooping cough morbidity and mortality.—The higher mortality from whooping cough among females has been found in all parts of the world. One explanation frequently given for the

higher rates in females is that complications occur more frequently because of a smaller lumen in the female larynx which acts as a mechanical obstruction during paroxysms of coughing. However, this hypothesis has not been universally accepted. Hill (*2*) in a study of mortality from whooping cough in England and Wales suggested that the difference might be due to a greater susceptibility to clinical attack, especially after the age of 2 years.

Morbidity data in the United States are available for only a comparatively few States in a form which permits a comparison of the relative numbers of cases reported by age and sex. However, the data shown in table 1 indicate that for ages under 10 years there has been no great excess in the number of reported ases among females while in age of 10 and over the excess has been quite striking. It must be borne in mind that in ages of 20 and over when the emale excess of cases was most marked only a ew cases were reported compared with the younger ages. The possibility that cases among females in the older age groups are more completely reported cannot be ignored and there probably is a greater amount of exposure of adult females to children with whooping cough.

TABLE 1.—*Ratio of female to male cases of whooping cough by age groups reported in certain States, 1935-1939*

Age in years	Connecticut	New Jersey	Maryland		Alabama	
			White	Colored	White	Colored
Under 1	0 95	1.00	1.01	0.98	1 21	1 11
1 to 4	1.04	1.06	1 11	1.31	1.11	1 07
5 to 9	1.03	1.07	1.11	1 01	1.08	1.25
10 to 14	1.10	1 15	1 06	1 65	83	1.71
15 to 19	.89	1.27	.84	1.00	1.36	1.23
20 and over	2.00	3.56	2 74	3 00	1.12	1 15

The ratio of female to male mortality from whooping cough shows an excess among females of all age groups. For the Registration Area the ratio of female to male deaths among white persons during the 5-year period from 1935 to 1939 was 1.09 under 1 year of age, 1.40 for 1- to 4-year group, 1.32 in the 5- to 9-year group, and 1.39 for those 10 years of age and over. Deaths among colored persons for the same years showed the following ratios: 1.10 under 1 year of age, 1.23 in the 1- to 4-year group, 1.20 in the 5- to 9-year group, and 1.17 in those 10 years of age and over. For all ages the white and colored ratios were 1.20 and 1.15, respectively. The ratio of rates for various racial groups in the United States (see table 2) indicate that all racial groups have an excess in female mortality.

Racial differences in mortality from whooping cough.—If reported cases are used to determine the incidence rates of whooping cough, it would have to be concluded that the incidence is much higher among

white persons than among colored. This does not seem reasonable, and since reliable data are not available to judge the relative differences in the white and colored populations any discussion of racial differences in morbidity will be omitted.

The differences in mortality in the white and colored populations of the southern States have already been mentioned in this report. The rates for the latter have been two to three times higher than those for the former, and this difference has existed in all age groups. Crude mortality rates have been calculated for several nonwhite groups in the Registration Area and tabulated in table 2. For the two 5-year periods from 1930 to 1939 the rates for Negroes were more than twice those for the white. The mortality among Indians has been more than six times higher, but among the Chinese and Japanese combined the rate has been approximately the same as for the white. The excess of mortality among females has been less for Negroes and greater for Indian and Chinese and Japanese than for the white population.

TABLE 2.—*Mortality rates per 100,000 population (all ages) from whooping cough in different racial groups in the registration area, by sex and ratio of female to male mortality*

	White	Negro	Indian	Chinese and Japanese
1930-34:				
Males	3.3	9.7	22 0	3 2
Females	4.1	10.7	28 8	6 4
1935-39:				
Males	2 4	6.9	19.7	1.5
Females	2.8	7.1	27.1	2 9
Ratio of female to male mortality:				
1930-34	1.24	1.10	1.31	2.00
1935-39	1.16	1 02	1.37	1 91

There has been very little difference in percentage distribution of deaths by age groups for white, Negro, and all other nonwhites combined in the Registration Area except for a slightly higher proportion of deaths among white infants under 6 months of age. When the first 2 years are combined the distribution is nearly identical for all racial groups.

Discussion.—In different parts of this report comment was made on the higher death rates from whooping cough in the southern and Mountain States. This difference was evident in crude and age specific rates by States and also in the distribution by counties. In attempting to explain these geographical differences in mortality many factors would have to be taken into consideration, some of which can be measured statistically while others are more intangible and cannot be measured at all or very inaccurately.

One of the striking characteristics of the population of States or counties in which there were relatively high rates of mortality from whooping cough from 1935 to 1939, inclusive, is the predominantly rural distribution of population, which includes all those living on farms and in villages with less than 2,500 inhabitants. This is in agreement with Godfrey's (3) statement in a report on whooping cough in New York State that mortality had been relatively high in villages and rural areas of that State. The percent of rural population in the individual States shows a high degree of correlation with mortality particularly with the age group under 1 year (table 3).

TABLE 3.—*Coefficients of correlation between certain factors and whooping cough mortality by States*

	Mortality rates per 100,000 population		
	Under 1 year	1 to 4 years	5 to 9 years
Percent of rural population	+.77±.06	+.52±.10	+.53±.10
Percent of dwellings with 1.51 or more persons per room	+.88±.03	+.58±.09	+.60±.09
Percent of families with 3 or more children under 10 years of age	+.74±.07	+.55±.10	+.57±.09
Percent nonwhite population	+.50±.11	+.44±.11	+.34±.13
Percent of illiteracy in persons 21 years or older	+.71±.07	+.54±.10	+.40±.12

A relatively large percentage of rural population may be a rough index of a comparatively low density of population per square mile of land area, but this may mask a certain amount of crowding within individual dwelling units. When the percentage of dwellings averaging 1.51 or more persons per room is correlated with mortality from whooping cough the resulting coefficient is of a very high order, +.88±.03 for the age group under 1 year, and somewhat less significant for children 1 to 4 and 5 to 9 years. Likewise, the percentage of families with three or more children under 10 years of age also shows a fairly high degree of correlation with mortality.

Although mortality rates are generally higher among nonwhite than white persons there is not as high a degree of correlation between the percentage of nonwhite population and mortality as was the case with the other factors discussed. This may be partly due to the fact that several States with relatively high mortality in the Mountain region have included in their white populations certain groups among whom the mortality rates are probably as high as among Negroes and Indians. Included in this category are relatively large numbers of Mexicans or persons of Spanish-American parentage.

It appears that the amount of illiteracy in the population may also be related in some manner with whooping cough mortality because there is a fairly high degree of correlation between the percentage of illiterates 21 years of age or older in the population and the death rate from whooping cough.

It does not seem unreasonable to suppose that these various factors which show a fairly high degree of correlation with mortality, especially among infants, are interrelated in their effects. A population living for the most part in rural areas on farms or in small villages, many of the dwellings housing more than an average of 1.5 person per room, many of the families having three or more children under 10 years of age, and a fairly large proportion of the adults being illiterate would seem to form an ideal combination of factors favoring high mortality from whooping cough.

The more intangible factors are those concerned with medical care. Comparatively few counties with relatively high mortality rates include large cities where hospitals and the services of physicians and nurses are more accessible. The lack of these facilities, their inaccessibility, or nonutilization of them even though available probably have contributed to the higher mortality in certain rural areas.

In recent years there has been an increasing interest in the development and use of prophylactic inoculations of whooping cough vaccine. Although a number of favorable reports on the use of vaccine have appeared, it has not been given on a sufficiently large scale to make it possible to judge its value in reducing mortality. If mortality continues to decline at the same rate during the next 15 years that it did during the past 15 years, it will be extremely difficult to show statistically that this prophylactic procedure had any effect in reducing mortality from whooping cough. Furthermore, with a large percentage of deaths (40 percent) occurring in infants under 6 months of age, inoculations would have to be given at an extremely early age to be effective. Whether or not vaccination would be effective if given before 3 months of age remains to be seen.

REFERENCES

(*1*) Fales, W. T.: The age distribution of whooping cough, chickenpox, scarlet fever, and diphtheria in various areas of the United States. Am. J. Hyg., **8**:759 (1928).

(*2*) Hill, A. B.: Some aspects of the mortality from whooping cough. J. Royal Statistical Soc., **96**:250 (1933).

(*3*) Godfrey, E. S., Jr.: Epidemiology of whooping cough. New York State J. Med., **28**:1410 (1928).

APPENDIX

TABLE 1.—*Reported case and death rates from whooping cough per 100,000 population, and number of cases per death in certain States and cities, 1910–39*

Years	Connecticut	Massachusetts	New York State, exclusive of New York City	New York City	Chicago	Michigan	Wisconsin	Kansas	Utah
	Reported case rates								
1910–14	114	96	134	63	110	46	43	72	593
1915–19	129	165	194	101	132	68	102	99	560
1920–24	190	190	263	105	135	159	228	162	892
1925–29	190	200	230	77	99	185	255	186	759
1930–34	189	225	280	102	128	224	300	180	873
1935–39	205	182	227	98	167	243	320	137	595
	Death rates								
1910–14	12.2	6.9	9.3	6.9	6.1	9.0	8.5	6.4	13.2
1915–19	11.3	12.7	7.9	7.6	5.5	8.7	6.4	8.0	9.6
1920–24	9.0	8.6	6.5	6.2	4.5	8.1	6.3	6.6	13.6
1925–29	5.0	5.6	4.8	4.1	3.1	5.7	3.7	4.5	10.1
1930–34	2.1	3.0	2.9	2.1	1.7	3.6	2.6	3.1	4.1
1935–39	1.4	1.4	2.0	1.1	1.5	2.2	1.7	1.9	3.6
	Number of cases per death								
1910–14	9	14	14	9	18	5	5	11	45
1915–19	11	13	25	13	24	8	16	12	48
1920–24	21	22	40	17	30	20	36	24	66
1925–29	38	36	48	19	32	32	70	42	75
1930–34	90	75	97	50	75	66	115	58	213
1935–39	146	130	113	90	110	110	188	72	170

TABLE 2.—*Whooping cough case and death rates per 100,000 population and number of cases reported per death by States, 1925–39*

Division and State	Reported case rates			Death rates			Number of cases reported per death		
	1925 to 1929	1930 to 1934	1935 to 1939	1925 to 1929	1930 to 1934	1935 to 1939	1925 to 1929	1930 to 1934	1935 to 1939
NEW ENGLAND.									
Maine	155	234	222	7.1	6.0	3.6	20	39	62
New Hampshire	43	40	38	4.8	4.9	2.6	9	8	15
Vermont	427	378	343	6.4	4.4	3.2	66	86	107
Massachusetts	200	225	182	5.6	3.0	1.4	36	75	130
Rhode Island	57	153	193	9.6	3.3	3.1	6	46	62
Connecticut	190	189	205	5.0	2.1	1.4	38	90	146
MIDDLE ATLANTIC:									
New York	143	168	158	4.4	2.5	1.5	32	67	105
New Jersey	191	206	240	5.1	2.3	1.5	37	90	160
Pennsylvania	166	192	180	6.5	3.4	2.0	25	56	90
EAST NORTH CENTRAL:									
Ohio	177	171	143	6.4	3.4	2.5	28	50	74
Indiana	80	91	60	6.8	4.5	2.9	12	18	12
Illinois	144	120	145	4.2	2.6	2.2	50	52	96
Michigan	185	224	243	5.7	3.6	2.2	32	66	110
Wisconsin	255	300	320	3.7	2.6	1.7	70	115	188
WEST NORTH CENTRAL:									
Minnesota	77	97	93	4.3	2.7	1.8	18	36	57
Iowa	31	40	44	4.3	3.1	2.3	7	13	19
Missouri	77	93	65	6.9	4.7	3.5	11	20	19
North Dakota	89	110	108	5.9	4.3	4.1	15	26	26
South Dakota	59	77	66	5.5	6.0	3.2	11	13	21
Nebraska	52	76	36	4.9	3.9	1.8	11	15	20
Kansas	184	180	137	4.5	3.1	1.9	42	58	72

TABLE 2.—*Whooping cough case and death rates per 100,000 population and number of cases reported per death by States, 1925–39*—Continued

Division and State	Reported case rates			Death rates			Number of cases reported per death		
	1925 to 1929	1930 to 1934	1935 to 1939	1925 to 1929	1930 to 1934	1935 to 1939	1925 to 1929	1930 to 1934	1935 to 1939
SOUTH ATLANTIC:									
Delaware	63	117	146	7.5	5.6	4.4	8	21	33
Maryland	249	237	173	10.9	5.9	3.3	24	40	52
District of Columbia	151	117	120	5.1	4.1	3.0	30	29	40
Virginia	400	282	126	12.3	9.2	7.2	32	31	8
West Virginia	123	142	106	13.2	9.8	6.5	9	21	17
North Carolina	359	310	252	10.4	8.4	5.8	34	37	43
South Carolina	223	170	145	9.5	10.1	7.7	23	17	19
Georgia	45	54	50	-------	7.0	4.1	-------	8	12
Florida	50	31	38	4.5	5.4	3.0	11	9	13
EAST SOUTH CENTRAL:									
Kentucky	40	75	91	9.9	8.5	6.2	4	9	15
Tennessee	74	80	71	9.5	7.8	5.3	8	10	13
Alabama	60	63	54	10.3	8.1	5.5	6	8	10
Mississippi	692	474	352	9.7	8.9	5.4	71	53	65
WEST SOUTH CENTRAL:									
Arkansas	60	39	46	7.8	6.1	4.8	8	6	10
Louisiana	28	23	40	8.8	6.4	4.5	3	3	9
Oklahoma	51	27	36	5.6	4.9	4.1	9	5	9
Texas	35	64	94	2.9	4.4	4.1	12	14	23
MOUNTAIN:									
Montana	72	157	214	6.6	4.5	4.1	11	35	52
Idaho	80	70	60	5.1	5.2	3.7	16	13	16
Wyoming	123	112	132	4.7	4.1	5.5	26	28	24
Colorado	110	211	137	10.0	7.9	4.6	11	27	30
New Mexico	215	130	200	-------	10.9	11.5	-------	12	17
Arizona	47	144	144	9.1	12.3	9.3	5	12	16
Utah	759	873	595	10.1	4.1	3.6	75	213	170
Nevada	-------	133	107	1.8	4.0	3.9	-------	33	37
PACIFIC:									
Washington	136	161	126	3.0	1.9	1.3	45	85	97
Oregon	72	100	101	3.3	2.3	1.7	22	43	60
California	158	207	206	5.6	3.0	1.9	28	69	108

TABLE 3.—*Percentage distribution of cases of whooping cough by age groups in certain States*

State	Age group (years)													
	Under 1	1	2	3	4	0–4	5	6	7	8	9	5–9	10–14	15 and over
Connecticut:														
1921–24	10.7	6.6	10.6	12.8	11.0	51.7	12.1	12.1	8.6	5.2	2.9	40.9	5.5	1.7
1935–39	6.1	7.1	8.4	9.8	9.9	41.3	13.1	15.0	11.2	7.2	4.1	50.6	6.5	1.4
Massachusetts:														
1918–21	10.3	10.3	11.2	11.9	11.2	54.9	11.5	11.6	7.1	4.7	2.8	38.5	4.0	2.2
1935–39	7.5	8.4	10.0	11.1	11.6	48.6	12.9	14.9	9.9	5.5	2.8	46.0	4.1	.9
New York State, exclusive of New York City:														
1918–19	7.7	8.0	9.7	10.4	10.9	46.7	10.5	10.4	8.9	6.1	4.2	40.1	9.1	3.7
1935–39	7.3	7.5	9.2	10.2	10.3	44.6	13.0	13.4	10.1	6.4	3.7	46.6	6.7	2.0
New Jersey:														
1920–24	9.0	9.8	12.3	12.5	12.6	56.2	-----	-----	-----	-----	-----	39.1	3.0	1.7
1935–39	6.0	7.9	10.0	11.1	11.7	46.7	-----	-----	-----	-----	-----	47.8	4.7	.5
Maryland:														
White:														
1916–20	11.2	9.7	10.2	10.1	10.1	51.3	-----	-----	-----	-----	-----	36.3	8.9	3.5
1935–39	11.3	8.8	9.2	9.9	9.7	48.4	-----	-----	-----	-----	-----	43.5	3.6	1.5
Colored:														
1916–20	15.8	10.9	10.9	9.4	9.4	56.4	-----	-----	-----	-----	-----	29.6	9.9	3.5
1935–39	23.3	12.1	9.4	9.9	8.5	63.2	-----	-----	-----	-----	-----	27.3	9.0	.5
Virginia:														
White:														
1935–39	9.2	7.6	10.2	11.0	10.9	48.9	9.8	12.2	8.7	7.4	3.8	41.9	6.8	2.3
Colored:														
1935–39	16.6	11.5	11.8	10.4	8.9	59.2	8.2	8.2	7.2	5.2	2.6	31.4	5.9	3.9

TABLE 3.—*Percentage distribution of cases of whooping cough by age groups in certain States*—Continued

State	Age group (years)												
	Under 1	1	2	3	4	0-4	5	6	7	8	9	5-9	10-14	15 and over
Alabama.														
White:														
1925-29	14.3	11.5	11.7	9.9	9.8	57.2	8.4	9.8	7.2	5.6	3.3	34.3	5.9	2.5
1935-39	17.5	11.1	9.7	8.9	8.9	56.1	7.4	9.6	6.9	6.5	4.2	34.6	7.0	2.4
Colored:														
1925-29	30.0	19.2	12.7	7.9	6.3	76.1	4.7	5.4	2.7	3.1	1.7	17.6	3.5	2.9
1935-39	32.1	13.1	11.0	11.2	7.7	75.1	4.5	4.7	4.1	3.6	2.2	19.1	2.9	2.7
Tennessee:														
White.														
1935-39	12.0	12.3	10.5	9.0	9.4	53.2						37.8	7.3	1.6
Colored:														
1935-39	23.7	16.4	14.0	9.2	8.6	71.9						22.0	5.3	.9
Minnesota:														
1930-34	6.7	7.1	8.5	9.6	9.7	41.5						53.6	4.1	.7
1935-39	7.9	7.4	8.9	9.6	9.9	44.0						50.7	4.5	.8
Colorado:														
1938-39	10.4	9.0	10.0	11.8	10.3	51.5						41.9	4.9	1.4

TABLE 4.—*Percentage distribution of deaths from whooping cough by age groups in various geographical sections of the United States, 1935-39*

Geographical Section	Age group							
	Under 6 months	6-11 months	1 year	2 years	3 years	4 years	5-9 years	10-14 years
New England	41.3	28.3	21.8	7.3	2.9	1.7	2.8	0.1
Middle Atlantic	39.6	24.8	20.7	6.5	3.0	1.6	2.3	.3
East North Central	41.0	26.9	20.9	6.9	2.9	1.8	3.1	.6
West North Central	43.8	21.9	17.7	6.6	3.1	1.9	3.5	.6
South Atlantic:								
Total	36.9	24.8	22.5	6.3	3.7	2.1	3.0	.7
White	39.5	21.8	22.2	6.8	3.0	2.3	3.1	.6
Colored	30.0	34.8	22.1	6.5	4.3	2.0	2.7	.7
East South Central:								
Total	37.7	22.6	22.9	7.7	3.9	2.1	3.6	.8
White	39.5	19.6	22.3	7.5	3.7	1.9	3.6	.9
Colored	33.1	22.8	24.1	7.9	4.3	2.4	3.5	.6
West South Central:								
Total	42.0	21.4	20.4	6.2	3.3	1.6	2.8	.6
White	44.0	21.1	20.5	6.0	3.0	1.3	2.6	.6
Colored	37.3	22.1	20.1	6.9	4.1	2.3	3.4	.6
Mountain	39.0	23.3	20.8	7.7	2.7	2.1	3.3	.4
Pacific	41.8	23.7	19.4	5.9	2.7	1.2	3.0	.7
Registration area:								
Total	40.0	24.2	21.8	7.1	3.2	1.7	2.9	.5
White	42.3	23.5	21.4	7.0	3.0	1.6	3.0	.5
Colored	33.0	20.2	23.0	7.4	4.1	2.0	2.9	.7

TABLE 5.—*Mortality rates from whooping cough by age groups, 1925-39*

Division and State	Under 1 year			1 to 4 years			5 to 9 years			10 years and over		
	1925 to 1929	1930 to 1934	1935 to 1939	1925 to 1929	1930 to 1934	1935 to 1939	1925 to 1929	1930 to 1934	1935 to 1939	1925 to 1929	1930 to 1934	1935 to 1939
NEW ENGLAND:												
Maine	242.8	243.3	134.2	29.4	19.3	16.1	3.1	2.5	1.1	0.25	0.09	0.03
New Hampshire	200.0	221.3	104.0	29.1	18.3	13.3	2.9	1.4	1.0	0	.05	0
Vermont	265.6	168.0	135.5	17.0	11.5	11.4	2.3	3.5	.6	.20	.20	.07
Massachusetts	192.0	109.4	62.2	33.2	14.0	8.1	1.4	.9	.5	.22	.03	.01
Rhode Island	322.1	140.0	70.0	55.8	17.1	11.7	3.1	.9	.4	.04	0	0
Connecticut	173.1	96.5	72.2	27.1	10.1	5.8	1.3	.6	.3	0	.03	.01

Table 5.—*Mortality rates from whooping cough by age groups, 1925–39*—Con.

Division and State	Under 1 year			1 to 4 years			5 to 9 years			10 years and over		
	1925 to 1929	1930 to 1934	1935 to 1939	1925 to 1929	1930 to 1934	1935 to 1939	1925 to 1929	1930 to 1934	1935 to 1939	1925 to 1929	1930 to 1934	1935 to 1939
MIDDLE ATLANTIC.												
New York	162.0	104.6	71.2	26.2	14.2	8.3	1.4	1.1	.8	.03	.04	.02
New Jersey	188.0	93.4	67.1	32.8	14.2	9.6	1.9	.7	.5	.02	.03	.02
Pennsylvania	210.3	122.3	80.9	32.5	18.1	10.2	1.3	.6	.3	.05	.03	.01
EAST NORTH CENTRAL												
Ohio	211.4	121.7	98.8	35.5	18.4	13.4	2.0	1.6	1.1	.04	.07	.05
Indiana	241.8	163.6	114.2	40.3	20.7	11.6	2.1	2.0	1.3	.06	.07	.02
Illinois	141.5	99.8	94.0	25.2	17.4	12.2	1.2	.9	1.0	.03	.01	.02
Michigan	189.8	124.6	86.2	26.5	15.8	10.0	1.2	.9	.5	.04	.04	.04
Wisconsin	145.3	98.7	82.3	17.0	11.0	5.1	.7	.8	.7	0	.05	.01
WEST NORTH CENTRAL:												
Minnesota	153.6	103.8	84.9	16.6	11.1	4.9	1.3	.9	.1	0	.08	.01
Iowa	162.6	130.0	91.9	19.3	10.3	9.8	1.8	1.2	.7	.07	.06	.03
Missouri	230.5	175.8	142.8	40.0	26.8	19.0	3.1	1.5	1.4	.08	.07	.06
North Dakota	203.2	140.7	155.0	25.6	13.2	12.0	2.7	.8	.9	.04	0	.08
South Dakota	-----	172.7	110.9	-----	27.0	12.9	-----	2.2	1.6	-----	.11	.08
Nebraska	166.2	142.1	69.6	22.8	14.2	7.4	.9	2.0	1.0	.07	.09	.03
Kansas	150.9	108.0	82.8	24.0	15.0	7.5	.6	1.8	.2	.01	.04	.04
SOUTH ATLANTIC:												
Delaware	290.0	155.9	170.0	43.0	43.3	28.2	1.0	4.7	1.9	0	.29	0
Maryland:												
White	244.1	161.8	85.0	36.7	20.8	14.1	2.5	.9	.8	.08	.05	.09
Colored	683.1	411.5	330.9	143.0	100.0	45.7	5.6	2.8	2.1	0	.18	.78
District of Columbia:												
White	183.7	57.9	57.5	24.4	18.1	10.7	0	3.3	.8	0	0	0
Colored	411.1	314.0	183.0	88.7	78.5	55.8	0	1.7	0	0	.16	0
Virginia:												
White	220.0	193.3	168.9	40.5	32.4	23.4	2.4	1.8	2.4	.20	.11	.05
Colored	551.5	472.7	412.1	104.8	69.5	48.6	6.0	3.7	4.0	.50	.52	.62
West Virginia	295.7	244.5	186.0	58.0	41.7	25.6	3.7	2.5	2.0	.16	.13	.09
North Carolina:												
White	190.0	170.0	134.5	27.4	23.8	15.0	1.7	1.7	.9	.15	.06	.07
Colored	370.0	370.0	272.7	62.8	46.2	37.0	4.1	2.2	2.6	.47	.17	.05
South Carolina:												
White	224.8	201.0	176.2	32.5	22.7	15.8	1.3	1.5	.7	.20	.08	.17
Colored	402.1	391.4	290.0	55.1	49.5	42.4	4.4	3.0	2.0	.46	.20	.20
Georgia:												
White	-----	160.0	125.4	-----	23.4	14.8	-----	1.6	.9	-----	.05	.01
Colored	-----	276.4	200.0	-----	41.2	25.9	-----	3.5	1.6	-----	.09	.09
Florida:												
White	137.7	95.8	101.0	14.9	11.1	8.2	.8	.9	.6	.05	.13	.07
Colored	304.5	170.8	183.5	29.0	26.0	27.0	3.7	3.9	1.3	.06	.16	.15
EAST SOUTH CENTRAL:												
Kentucky:												
White	223.0	200.7	164.0	49.7	36.6	24.[illegible]	3.6	2.9	1.5	.14	.16	.05
Colored	437.8	489.5	3[illegible]5.0	110.4	63.4	72.2	5.4	5.0	3.9	.22	0	.11
Tennessee:												
White	220.0	175.6	155.0	44.6	30.8	20.6	2.9	2.0	1.8	.12	.10	.13
Colored	379.0	392.6	236.9	86.1	76.1	38.9	6.7	3.6	3.0	.16	.10	.05
Alabama:												
White	202.4	180.8	135.1	34.3	27.6	17.2	2.7	2.0	1.4	.16	.12	.04
Colored	331.4	270.4	204.0	60.0	42.9	27.9	2.1	1.6	2.2	.22	.16	.21
Mississippi:												
White	188.4	170.0	122.7	27.2	19.1	13.8	.8	1.5	2.1	.19	.09	.11
Colored	387.1	291.8	156.5	59.2	50.7	27.3	3.5	3.9	2.6	.29	.36	.12
WEST SOUTH CENTRAL:												
Arkansas:												
White	-----	150.0	132.3	-----	23.1	16.6	-----	1.7	1.0	-----	.07	.13
Colored	-----	215.0	190.4	-----	40.0	32.4	-----	2.2	1.9	-----	.16	.06
Louisiana:												
White	214.6	145.2	124.5	25.6	18.3	9.7	1.4	1.4	.9	.06	.10	.02
Colored	372.0	269.1	208.1	57.1	34.8	25.6	5.7	3.5	1.5	.34	.42	0
Oklahoma	-----	152.8	147.0	-----	18.0	14.2	-----	1.2	1.3	-----	.09	.11
Texas	-----	-----	154.8	-----	-----	16.0	-----	-----	1.1	-----	-----	.05
MOUNTAIN:												
Montana	226.4	146.4	155.0	25.5	20.5	17.3	1.8	2.3	1.3	.23	.18	0
Idaho	175.5	168.0	133.3	24.4	15.7	8.6	1.2	2.8	1.2	.06	.16	.05
Wyoming	174.9	155.5	147.9	30.0	10.8	28.8	1.7	.9	3.5	.23	.21	.20
Colorado	304.6	256.6	173.3	50.6	42.6	20.8	2.5	2.3	.6	.16	.14	.06
New Mexico	-----	235.0	300.0	-----	40.0	41.8	-----	2.8	2.3	-----	.41	.10
Arizona		300.0	269.3	-----	55.0	37.0	-----	2.7	2.7	-----	.11	.37
Utah	255.0	165.0	110.0	39.6	15.8	12.9	.9	.3	1.8	.06	.15	0
Nevada		181.2	217.1	-----	13.0	8.2	-----	2.6	0	-----	0	0
PACIFIC:												
Washington	143.2	90.3	56.1	17.2	7.4	6.4	2.4	1.1	.6	.01	0	.08
Oregon	152.3	108.8	87.6	18.4	11.9	6.3	.8	1.2	.8	.03	.07	.02
California	260.2	132.7	95.1	34.6	18.7	10.5	1.7	1.1	.7	.34	.19	.15

SICKNESS ABSENTEEISM AMONG INDUSTRIAL WORKERS, FINAL QUARTER OF 1942, WITH A NOTE ON THE OCCURRENCE OF BRONCHITIS AND PNEUMONIA, 1933–42[1]

By W. M. Gafafer, *Senior Statistician, United States Public Health Service*

The accompanying data are derived from analyses of periodic reports on sickness and nonindustrial injuries causing disability lasting more than 7 days among approximately 250,000 male members of

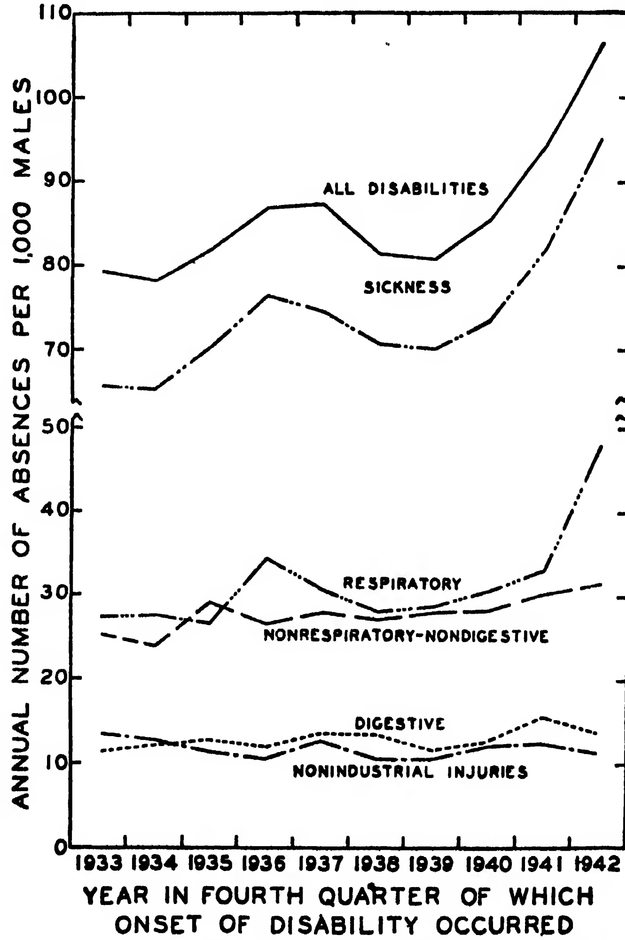


Figure 1.—Average annual number of absences per 1,000 males on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, by broad cause group, variation of the fourth quarter rates with time; experience of male employees in various industries, 1933–42, inclusive.

industrial sick benefit associations, group insurance plans, and company relief departments.

[1] From the Division of Industrial Hygiene, National Institute of Health. The report for the third quarter appeared in Public Health Reports, 58: 232–234 (February 5, 1943).

Final quarter of 1942.—The rate of 95.3 for sickness yields a 16 percent excess when compared with the corresponding rate (81.9) for 1941, and a 28 percent excess when compared with the mean of the corresponding rates for the 10 years 1933–42. The excess in the fourth quarter sickness rate shown by a comparison of 1942 with 1941 reflects principally the 44 percent increase in the rate for the respiratory diseases, each of the cause groups of the respiratory group showing an increase. Of considerable interest are the increases of 138 percent in pneumonia, 54 percent in influenza and grippe, and 27 percent in bronchitis.

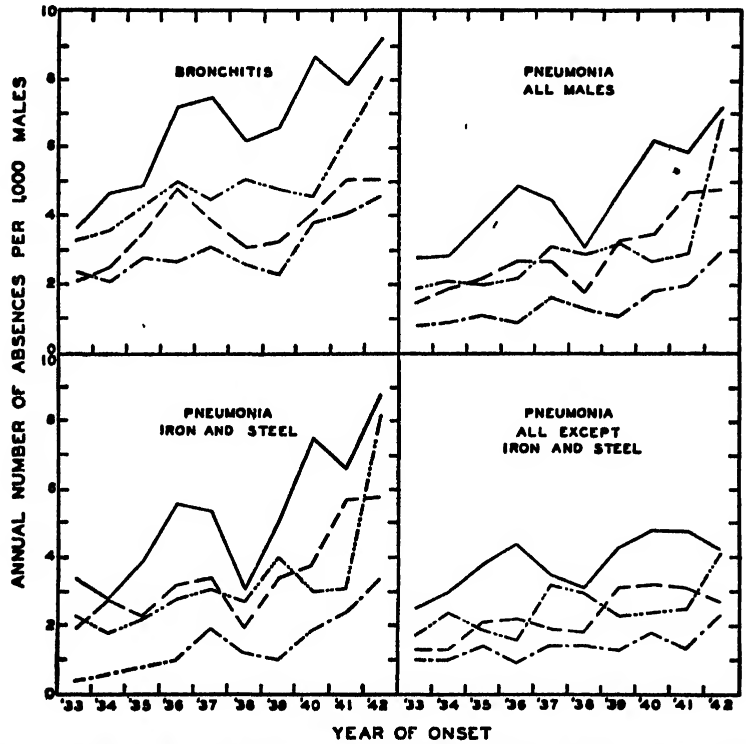


FIGURE 2.—Average annual number of absences per 1,000 males on account of bronchitis and pneumonia disabling for 8 consecutive calendar days or longer, variation of specific quarterly rates with time; experience of male employees in various industries, 1933–42, inclusive. (*Legend:* Solid line, 1st quarter; broken line, 2d quarter; dash-one dot, 3d quarter; dash-two dots, 4th quarter.)

The rate for the nonrespiratory-nondigestive diseases (31.5) does not show a notable increase when compared with the corresponding rate for the preceding year but it is the highest recorded for the 10-year experience, being 13 percent in excess of the 10-year mean (27.9).

The fourth quarter rates for the broad cause groups covering the period 1933–42 are shown graphically in figure 1.

Bronchitis and pneumonia, 1933–42.—Figure 2 shows for each of the 4 quarters the increasing trends over a 10-year period in the rates for bronchitis and pneumonia, the pneumonia rates representing, respectively, the experience for all males, and for those employed and not employed in the iron and steel industry.

The 1942 fourth quarter rate for bronchitis is 60 percent above the mean (5.0) of the 10 fourth quarters covering 1933–42. The corresponding excess for pneumonia, all males, is 130 percent while for the iron and steel workers, and the noniron and steel workers, the pneumonia excess is 145 percent and 64 percent, respectively. The notable excess shown by the iron and steel workers might be partially attributed to the extraordinary increase in the number of iron and steel workers during the latter part of the 10-year period.

TABLE 1.—*Average annual number of absences on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer among* MALE *employees in various industries, by cause, the fourth quarter of 1942 compared with the fourth quarter of 1941, and the year 1942 compared with the years 1937–41, inclusive*[1]

Cause (Numbers in parentheses are disease title numbers from the International List of Causes of Death, 1939)	Annual number of absences per 1,000 males				
	Fourth quarter		Year		
	1942	1941	1942	1941	1937–41
Sickness and nonindustrial injuries	106.5	94.3	105.3	102.5	94.9
Nonindustrial injuries (169–195)	11.2	12.4	11.6	12.0	11.5
Sickness	95.3	81.9	93.7	90.5	83.4
Respiratory diseases	47.8	33.1	41.4	41.6	36.6
Tuberculosis of the respiratory system (13)	.8	.5	.8	.7	.8
Influenza, grippe (33)	18.6	12.1	15.7	19.2	17.0
Bronchitis, acute and chronic (106)	8.0	6.3	6.7	5.8	4.9
Pneumonia, all forms (107–109)	6.9	2.9	5.5	3.8	3.2
Diseases of the pharynx and tonsils (115b, 115c)	4.9	4.3	5.2	5.5	5.0
Other respiratory diseases (104, 105, 110–114)	8.6	7.0	7.5	6.6	5.7
Digestive diseases	13.7	15.6	16.0	15.3	14.2
Diseases of the stomach except cancer (117, 118)	4.4	4.5	4.7	4.1	3.9
Diarrhea and enteritis (120)	1.5	1.4	1.8	1.5	1.3
Appendicitis (121)	3.7	5.5	4.8	5.2	4.7
Hernia (122a)	1.6	1.4	1.8	1.6	1.6
Other digestive diseases (115a, 115d, 116, 122b–129)	2.5	2.8	2.9	2.9	2.7
Nonrespiratory-nondigestive diseases	31.5	30.2	34.2	30.5	30.1
Infectious and parasitic diseases (1–12, 14–24, 26–29, 31, 32, 34–44)[2]	1.6	2.4	2.5	2.5	2.3
Rheumatism, acute and chronic (58, 59)	3.6	3.3	3.9	3.8	3.9
Neurasthenia and the like (part of 84d)	1.1	.8	1.1	.9	1.0
Neuralgia, neuritis, sciatica (87b)	2.3	2.2	2.2	2.1	2.2
Other diseases of the nervous system (80–85, 87, except part of 84d, and 87b)	1.1	1.5	1.1	1.3	1.1
Diseases of the heart and arteries, and nephritis (90–99, 102, 130–132)	4.4	3.5	4.4	4.0	4.2
Other diseases of the genitourinary system (133–138)	2.5	2.5	2.6	2.4	2.4
Diseases of the skin (151–153)	2.8	2.5	3.0	2.8	2.9
Diseases of the organs of movement except diseases of the joints (156b)	2.9	3.1	3.0	3.0	2.8
All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, 156a, 157, 162)	9.2	8.4	10.4	7.7	7.3
Ill-defined and unknown causes (200)	2.3	3.0	2.1	3.1	2.5
Average number of males covered in the record	264,241	245,611	261,756	232,180	966,101
Number of organizations	21	22	22	22	---------

[1] Industrial injuries, venereal diseases, and a few numerically unimportant causes of disability are not reported.
[2] Except influenza, respiratory tuberculosis, and the venereal diseases.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 17, 1943

Summary

The continued high incidence of meningococcus meningitis and the excess in urban deaths as compared with last year and the 3-year (1940–42) average are the most important features of the present health situation as revealed by current communicable disease reports and mortality in large cities.

A total of 604 cases of meningococcus meningitis was reported for the week, as compared with 587 for the preceding week (exclusive of delayed reports for both weeks). As compared with the preceding week, decreases were recorded in the New England, East and West South Central, and Mountain States, and as compared with the averages for the past 3 weeks decreases were reported in those areas and also in the Pacific States, while an increase was shown in the Mountain States. Other areas recorded increases over both the preceding week and the 3-week average. States reporting the largest numbers during the current week were as follows (preceding week's figures in parentheses): New York, 69 (48); Pennsylvania, 43 (39); Massachusetts, 40 (38); California, 38 (38); Missouri, 36 (33); Virginia, 27 (29); North Carolina, 26 (20); New Jersey, 23 (28). The cumulative total for the first 15 weeks of the year is 7,051, as compared with 1,152 for the same period of 1942 and a 5-year median of 766.

Included in other reports for the week are the following: Anthrax, 1 case (in Pennsylvania); dysentery, all forms, 257; infectious encephalitis, 11; Rocky Mountain spotted fever, 4; tularemia, 12; and endemic typhus fever, 36.

Deaths recorded during the current week in 87 large cities of the United States aggregated 9,602, as compared with 9,434 for the preceding week and a 3-year average of 8,691. The accumulated number for the first 15 weeks of the year is 147,923, as compared with 135,235 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended April 17, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occured.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	Apr. 17, 1943	Apr. 18, 1942		Apr. 17, 1943	Apr. 18, 1942		Apr. 17, 1943	Apr. 18, 1942		Apr. 17, 1943	Apr. 18, 1942	
NEW ENG.												
Maine	0	0	1	2	2	2	12	135	114	5	5	0
New Hampshire	0	0	0	-----	-----	-----	27	34	34	2	0	0
Vermont	0	2	0	-----	-----	-----	279	100	48	0	0	0
Massachusetts	3	4	4	-----	-----	-----	1,834	1,314	921	40	2	2
Rhode Island	0	0	0	1	-----	-----	14	264	51	8	0	0
Connecticut	0	0	1	3	3	4	430	565	228	17	0	0
MID. ATL.												
New York	36	19	19	[1] 17	[1] 14	[1] 14	2,903	784	1,839	69	16	7
New Jersey	8	3	5	19	6	10	1,937	829	829	23	4	2
Pennsylvania	12	12	23	2	-----	-----	2,295	1,264	1,264	43	9	8
E. NO. CEN.												
Ohio	13	3	11	14	9	9	1,196	538	538	18	0	0
Indiana	3	5	6	66	22	22	616	143	143	16	1	0
Illinois	28	17	17	30	6	23	1,545	665	665	13	0	1
Michigan [2]	8	8	7	11	3	8	1,616	437	464	17	3	3
Wisconsin	3	1	1	34	56	89	2,277	953	953	4	0	0
W. NO. CEN.												
Minnesota	3	2	2	2	1	1	153	887	178	2	0	0
Iowa	3	7	7	-----	-----	9	301	328	309	12	1	1
Missouri	3	7	5	3	5	5	392	721	274	36	6	1
North Dakota	0	1	1	4	6	13	0	55	26	0	0	0
South Dakota	1	2	2	-----	-----	-----	125	17	9	0	0	0
Nebraska	1	2	0	2	66	-----	311	349	67	1	0	0
Kansas	5	5	4	5	4	18	623	583	597	4	1	1
SO. ATL.												
Delaware	0	0	0	-----	-----	-----	95	13	13	6	1	0
Maryland [2]	0	4	2	6	9	11	168	521	215	16	8	1
Dist. of Col.	0	0	2	1	2	2	83	82	82	2	2	0
Virginia	3	10	10	277	313	313	488	322	486	27	7	2
West Virginia	5	2	6	33	5	28	116	159	159	5	0	2
North Carolina	4	11	11	2	21	21	173	1,130	1,130	26	1	1
South Carolina	4	3	8	630	411	411	251	211	211	18	1	0
Georgia	3	7	7	80	48	92	406	203	203	12	1	1
Florida	4	2	4	16	3	7	52	297	297	19	0	0
E. SO. CEN.												
Kentucky	5	4	4	6	-----	10	361	126	126	14	0	0
Tennessee	5	3	4	78	49	87	360	114	145	10	1	1
Alabama	5	7	9	108	136	136	243	137	144	6	6	3
Mississippi [3]	7	8	5	-----	-----	-----	-----	-----	-----	14	2	2
W. SO. CEN.												
Arkansas	2	4	7	28	53	99	193	171	171	[3] 16	1	0
Louisiana	9	9	9	16	7	20	84	251	167	2	0	0
Oklahoma	3	8	7	105	137	137	51	331	146	4	0	0
Texas	29	28	28	1,378	690	690	1,297	2,194	882	13	7	2
MOUNTAIN												
Montana	1	0	1	-----	3	3	197	106	74	0	0	0
Idaho	0	0	0	2	-----	2	67	92	52	5	0	0
Wyoming	0	1	0	20	138	-----	126	79	58	1	0	0
Colorado	12	1	12	25	42	23	[4] 1,478	279	375	4	0	0
New Mexico	0	4	4	2	10	6	22	65	65	1	0	0
Arizona	1	0	2	108	100	100	77	155	53	6	0	0
Utah [2]	0	0	0	-----	-----	6	207	519	374	0	0	0
Nevada	0	0	-----	6	-----	-----	36	130	-----	1	0	-----
PACIFIC												
Washington	4	0	0	3	-----	-----	716	209	209	12	0	0
Oregon	3	0	3	11	21	21	357	203	203	11	1	0
California	5	8	14	71	267	186	1,203	6,930	541	38	1	1
Total	244	224	272	3,227	2,668	2,842	27,793	25,994	25,994	[3] 619	88	49
15 weeks	4,142	4,486	5,485	63,965	67,152	129,527	[4] 263,578	254,951	254,951	7,051	1,152	766

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for week ended Ap.il 17, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	Apr. 17, 1943	Apr. 18, 1942		Apr. 17, 1943	Apr. 18, 1942		Apr. 17, 1943	Apr. 18, 1942		Apr. 17, 1943	Apr. 18, 1942	
NEW ENG.												
Maine	0	0	0	14	6	15	0	0	0	0	1	1
New Hampshire	0	0	0	8	12	7	0	0	0	1	0	0
Vermont	0	0	0	4	5	13	0	0	0	0	0	0
Massachusetts	1	0	0	660	462	206	0	0	0	2	2	0
Rhode Island	0	1	0	24	8	12	0	0	0	0	0	0
Connecticut	0	0	0	114	37	97	0	0	0	0	2	2
MID. ATL.												
New York	0	3	1	635	457	727	0	0	0	0	9	5
New Jersey	1	0	0	125	167	214	0	0	0	3	0	1
Pennsylvania	1	0	0	376	290	420	0	0	0	6	3	6
E. NO. CEN.												
Ohio	0	1	0	273	311	311	4	0	1	2	3	1
Indiana	0	0	0	122	115	137	3	1	1	0	1	1
Illinois	0	0	0	201	281	514	2	1	3	4	7	3
Michigan [2]	0	0	0	108	122	373	0	2	2	1	0	1
Wisconsin	0	1	1	377	148	148	1	0	2	0	1	1
W. NO. CEN.												
Minnesota	1	0	0	71	76	52	0	0	3	0	0	0
Iowa	0	0	0	57	51	78	1	0	19	0	1	1
Missouri	2	0	0	152	116	109	2	3	6	0	1	1
North Dakota	0	0	0	6	22	13	0	1	1	1	0	0
South Dakota	0	0	0	19	22	17	0	0	2	0	0	0
Nebraska	0	0	0	117	36	27	0	0	0	0	0	0
Kansas	0	0	0	56	90	81	0	0	1	1	0	1
SO. ATL.												
Delaware	0	0	0	7	53	12	0	0	0	0	0	0
Maryland [2]	0	0	0	148	63	47	0	0	0	0	2	1
Dist. of Col.	0	0	0	16	15	18	0	0	0	1	0	1
Virginia	0	1	0	30	39	39	0	0	0	2	0	2
West Virginia	0	0	1	26	29	29	0	0	0	4	3	1
North Carolina	0	0	0	47	22	22	3	0	0	0	2	2
South Carolina	0	1	0	3	4	6	0	0	0	1	1	2
Georgia	0	0	0	10	17	14	0	0	0	1	2	3
Florida	0	0	0	8	5	5	0	0	0	1	6	3
E. SO. CEN.												
Kentucky	1	1	0	38	73	79	0	0	0	5	4	4
Tennessee	0	1	1	38	44	66	0	4	2	1	2	2
Alabama	2	0	0	9	26	15	1	0	0	1	4	3
Mississippi [2]	1	0	0	10	7	7	0	1	1	2	3	1
W. SO. CEN.												
Arkansas	0	0	0	7	6	4	3	3	3	0	4	4
Louisiana	0	0	0	5	8	7	0	0	0	5	6	6
Oklahoma	0	0	0	16	17	19	0	4	4	1	0	1
Texas	1	0	1	63	56	50	1	0	5	8	6	6
MOUNTAIN												
Montana	0	0	0	6	20	20	0	0	0	0	0	0
Idaho	0	0	0	42	0	6	1	0	1	0	1	0
Wyoming	0	0	0	54	15	7	0	1	0	0	0	0
Colorado	0	0	0	45	26	34	0	0	1	0	0	0
New Mexico	1	1	0	17	10	10	0	0	0	3	0	0
Arizona	1	0	0	11	3	6	0	0	0	0	0	1
Utah [2]	0	0	0	30	16	16	0	0	0	0	0	0
Nevada	0	0	------	4	5	------	0	0	------	0	0	------
PACIFIC												
Washington	0	1	0	44	34	34	0	0	0	0	3	1
Oregon	1	0	0	38	2	14	2	0	2	1	0	0
California	5	2	2	192	82	129	0	0	5	1	3	3
Total	19	14	14	4,483	3,531	4,409	24	21	72	59	83	83
15 weeks	378	327	327	59,767	59,424	71,706	395	348	1,075	802	1,126	1,165

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 17, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Whooping cough, Week ended— Apr. 17, 1943	Whooping cough, Week ended— Apr. 18, 1942	Whooping cough, Median 1938–42	Week ended Apr. 17, 1943: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENG.												
Maine	44	15	43	0	0	0	0	0	0	0	0	0
New Hampshire	0	17	6	0	0	0	0	0	0	0	0	0
Vermont	15	56	28	0	0	0	0	0	0	0	0	0
Massachusetts	127	243	175	0	0	1	0	0	0	0	0	0
Rhode Island	52	26	21	0	0	0	0	0	0	0	0	0
Connecticut	31	87	46	0	0	1	0	1	0	0	0	0
MID. ATL.												
New York	346	433	430	0	18	15	0	0	0	0	0	0
New Jersey	186	282	99	0	1	0	0	0	0	0	0	0
Pennsylvania	246	163	308	1	0	0	0	0	0	0	0	0
E. NO. CEN.												
Ohio	191	187	187	0	0	0	0	4	0	0	1	0
Indiana	73	67	41	0	0	0	0	0	0	0	0	0
Illinois	150	176	114	0	0	0	0	1	0	0	0	0
Michigan [2]	255	135	149	0	1	0	0	0	0	0	0	0
Wisconsin	213	168	168	0	0	0	0	0	0	0	0	0
W. NO. CEN.												
Minnesota	87	30	30	0	1	0	0	0	0	0	0	0
Iowa	17	16	17	0	0	0	0	0	0	0	0	0
Missouri	51	18	22	0	0	0	2	0	0	0	0	0
North Dakota	2	17	17	0	0	0	0	0	0	0	0	0
South Dakota	2	2	2	0	0	0	0	0	0	0	0	0
Nebraska	9	11	8	0	0	0	0	0	0	0	0	0
Kansas	94	63	63	0	0	0	0	1	0	0	1	0
SO. ATL.												
Delaware	1	4	4	0	0	0	0	0	0	0	0	0
Maryland [3]	105	45	45	0	0	0	0	1	0	0	0	0
Dist. of Col.	28	19	18	0	0	0	0	0	0	0	0	0
Virginia	125	43	56	0	0	0	37	0	0	0	1	0
West Virginia	54	26	49	0	0	0	0	0	0	0	0	0
North Carolina	152	95	222	0	0	0	0	0	0	1	1	3
South Carolina	30	89	82	0	0	1	0	0	0	0	0	0
Georgia	38	20	32	0	0	0	0	0	0	0	5	5
Florida	17	12	13	0	1	2	0	0	0	0	0	3
E. SO. CEN.												
Kentucky	0	91	47	0	0	0	0	0	0	0	0	0
Tennessee	79	26	36	0	0	0	0	0	0	0	1	0
Alabama	80	101	48	0	0	0	0	0	0	0	0	4
Mississippi [2]	------	----	------	0	0	0	0	0	0	0	0	0
W. SO. CEN.												
Arkansas	25	7	24	0	5	1	0	0	0	0	2	0
Louisiana	18	8	9	0	1	0	0	0	0	0	1	3
Oklahoma	33	16	20	0	0	0	0	0	0	0	0	0
Texas	690	201	303	0	5	121	0	2	0	0	0	18
MOUNTAIN												
Montana	13	12	12	0	0	2	0	0	0	0	0	0
Idaho	12	2	15	0	0	0	0	0	0	0	0	0
Wyoming	1	15	5	0	0	0	0	0	0	2	0	0
Colorado	8	46	46	0	0	1	0	1	0	0	0	0
New Mexico	19	44	29	0	0	0	0	0	0	0	0	0
Arizona	18	54	37	0	3	0	35	0	0	0	0	0
Utah [2]	75	58	58	0	0	0	0	0	0	0	0	0
Nevada	3	14	------	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	43	50	55	0	0	0	0	0	0	0	0	0
Oregon	18	26	19	0	0	0	0	0	0	1	0	0
California	410	309	309	0	0	2	0	0	0	0	0	0
Total	4,286	3,645	3,645	1	36	147	74	11	0	4	13	36
15 weeks	60,166	57,746	61,897	23	441	2,943	670	166	7	9	258	715

[1] New York City only. [2] Period ended earlier than Saturday. [3] Delayed report of 15 cases included.
[4] A later report shows 1,082 cases of measles in Colorado for the week ended Apr. 10 instead of the number previously published.

WEEKLY REPORTS FROM CITIES

City reports for week ended April 3, 1943

This table lists the reports from 89 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENG.												
Maine:												
Portland	0	0	------	0	0	4	6	0	3	0	0	29
New Hampshire:												
Concord	0	0	------	0	0	0	3	0	0	0	0	0
Vermont:												
Barre	0	0	------	0	1	0	0	0	0	0	0	0
Massachusetts:												
Boston	0	0	------	0	150	16	30	0	196	0	1	40
Fall River	0	0	------	0	51	1	1	0	2	0	0	14
Springfield	0	0	------	0	10	1	1	0	73	0	0	0
Worcester	0	0	------	0	362	0	13	0	9	0	0	11
Rhode Island:												
Providence	0	0	1	0	2	7	5	0	6	0	0	37
Connecticut:												
Bridgeport	0	0	------	0	0	0	1	0	3	0	0	1
Hartford	1	0	------	0	24	1	4	0	0	0	0	3
New Haven	0	0	------	1	3	1	3	0	5	0	0	5
MID. ATL.												
New York:												
Buffalo	0	0	1	1	105	5	9	0	17	0	0	17
New York	17	1	19	2	672	45	80	0	391	0	3	73
Rochester	0	1	------	0	44	1	6	0	12	0	0	20
Syracuse	0	0	------	0	63	2	5	0	16	0	0	20
New Jersey:												
Camden	3	0	------	0	24	2	2	0	2	0	0	0
Newark	0	0	5	2	246	4	7	0	14	0	0	9
Trenton	0	0	1	0	72	0	1	0	11	0	0	2
Pennsylvania:												
Philadelphia	0	0	5	5	522	14	34	0	125	0	0	70
Pittsburgh	0	0	1	2	19	1	6	0	8	0	0	24
Reading	0	0	------	0	175	0	3	0	5	0	0	10
E. NO. CEN.												
Ohio:												
Cincinnati	0	0	2	3	116	0	5	0	42	0	0	5
Cleveland	1	0	2	0	13	2	10	0	43	0	0	47
Columbus	0	0	2	2	18	0	4	0	15	0	0	3
Indiana:												
Fort Wayne	0	0	------	0	4	0	0	0	7	0	0	0
Indianapolis	1	0	------	1	231	0	12	0	25	0	0	12
South Bend	0	0	------	0	3	0	0	0	0	0	0	0
Terre Haute	0	0	------	0	13	0	2	0	0	0	0	0
Illinois:												
Chicago	13	0	3	1	768	12	32	0	81	0	3	70
Springfield	0	0	------	0	12	0	0	0	5	0	0	16
Michigan:												
Detroit	5	0	------	3	541	8	30	0	32	0	0	77
Flint	0	0	------	0	24	0	7	0	3	0	0	12
Grand Rapids	0	0	------	1	11	0	7	0	5	0	0	14
Wisconsin:												
Kenosha	0	0	------	0	0	0	0	0	5	0	0	0
Milwaukee	0	0	1	0	460	2	9	0	177	0	0	41
Racine	0	0	------	0	10	0	0	0	18	0	0	2
Superior	0	0	------	0	0	0	0	0	1	0	0	6
W. NO. CEN.												
Minnesota:												
Duluth	0	0	------	0	3	0	2	0	2	0	0	3
Minneapolis	1	0	------	0	66	2	5	0	17	0	0	16
St. Paul	1	0	------	0	15	1	4	0	7	0	1	48
Missouri:												
Kansas City	0	1	------	0	132	8	6	0	35	0	0	4
St. Joseph	0	0	------	0	3	0	5	0	0	0	0	0
St. Louis	0	0	------	0	51	16	16	0	16	0	0	25

City reports for week ended April 3, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
W. NO. CEN.—con.												
North Dakota:												
Fargo	0	0	-----	0	4	0	0	0	1	0	0	0
Nebraska:												
Omaha	0	0	-----	0	1	0	5	0	6	0	0	3
Kansas:												
Topeka	1	0	------	0	308	0	3	0	0	0	0	11
Wichita	0	0	1	0	102	0	1	0	1	0	0	23
SO. ATL.												
Delaware:												
Wilmington	0	0	------	0	27	0	3	0	3	0	0	2
Maryland:												
Baltimore	4	0	3	1	57	15	18	0	57	0	2	90
Cumberland	0	0	------	0	0	1	1	0	1	0	0	0
Frederick	0	0	------	0	5	0	0	0	0	0	0	0
Dist. of Col.:												
Washington	0	0	1	1	75	5	7	1	20	0	0	42
Virginia:												
Lynchburg	0	0	------	0	4	0	0	0	1	0	0	3
Richmond	0	0	-----	2	11	1	3	0	6	0	0	0
Roanoke	0	0	------	0	1	0	1	0	2	0	0	0
West Virginia:												
Charleston	0	0	1	0	0	0	0	0	0	0	0	0
Wheeling	0	0	------	0	6	0	2	0	0	0	0	1
North Carolina:												
Wilmington	0	0	------	1	22	0	0	0	2	0	0	14
Winston-Salem	0	0	------	0	2	0	7	0	2	0	0	25
South Carolina:												
Charleston	0	0	34	0	8	1	1	0	0	0	0	1
Georgia:												
Atlanta	0	0	23	1	11	0	2	0	3	0	0	6
Brunswick	0	0	1	1	2	0	0	0	0	0	0	0
Savannah	0	0	8	0	0	1	2	0	1	0	0	2
Florida:												
Tampa	0	0	------	0	0	0	2	0	0	0	0	0
E. SO. CEN.												
Tennessee:												
Memphis	0	0	14	3	232	0	4	0	5	0	2	32
Nashville	0	0	------	0	42	0	3	0	1	0	0	2
Alabama:												
Birmingham	0	0	4	1	5	0	4	0	2	0	0	0
Mobile	0	0	1	0	2	0	3	0	1	0	0	0
W. SO. CEN.												
Arkansas:												
Little Rock	0	0	4	0	10	0	2	0	0	0	0	6
Louisiana:												
New Orleans	2	0	5	2	61	4	12	0	5	0	1	0
Shreveport	0	0	------	0	0	0	7	0	2	0	1	0
Texas:												
Dallas	1	0	------	0	0	2	5	0	6	0	0	12
Galveston	0	0	------	0	6	0	3	0	0	0	0	1
Houston	3	0	------	0	14	1	8	0	3	0	0	4
San Antonio	1	0	3	0	7	0	8	0	0	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0	------	0	0	0	0	0	1	0	0	0
Great Falls	0	0	------	0	36	0	1	0	1	0	0	3
Helena	0	0	------	0	102	0	0	0	1	0	0	0
Missoula	0	0	------	0	2	0	0	0	1	0	0	0
Idaho:												
Boise	0	0	------	0	12	0	0	0	0	0	0	0
Colorado:												
Denver	5	0	20	1	528	2	4	0	8	0	0	4
Pueblo	0	0	------	0	7	0	2	0	2	0	0	4
Utah:												
Salt Lake City	0	0	------	0	137	1	3	1	19	0	0	33

City reports for week ended April 3, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	3	0	------	1	111	2	8	0	4	0	0	11
Spokane	1	0	1	1	150	0	4	0	3	0	0	6
Tacoma	0	0	------	0	17	0	0	0	2	0	0	0
California:												
Los Angeles	4	0	11	3	99	2	5	0	14	0	0	45
Sacramento	0	0	------	0	10	1	2	1	3	0	0	1
San Francisco	1	0	---	1	80	12	16	0	22	0	0	38
Total	69	3	178	44	7,355	207	538	3	1,646	0	14	1,212
Corresponding week 1942	62	1	147	31	4,897	49	438	3	1,427	5	17	961
Average, 1938–42	83	------	318	[1] 47	[2] 5,487	------	[1] 485	------	1,677	12	20	1,097

Anthrax.—Cases: Milwaukee, 1; Camden, 1.
Dysentery, amebic.—Cases: New York, 20; Chicago, 1.
Dysentery, bacillary.—Cases: Cleveland, 1; St. Louis, 2, Charleston, S. C., 2; Buffalo, 1; New York, 4; Los Angeles, 3.
Dysentery, unspecified.—Cases: San Antonio, 3.
Tularemia.—Cases: Columbus, 1; Wichita, 1.

[1] 3-year average, 1940–42.
[2] 5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 89 cities in the preceding table (estimated population, 1942, 34,720,600)

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENG.	2.5	0.0	2.5	2.5	1,498	77.0	166.5	0.0	738	0.0	2.5	348
MID. ATL.	8.9	0.9	14.3	5.4	866	33.0	68.2	0.0	268	0.0	1.3	109
E. NO. CEN.	11.7	0.0	5.8	5.8	1,299	14.0	68.9	0.0	208	0.0	1.8	178
W. NO. CEN.	5.9	2.0	2.0	0.0	1,339	52.8	91.9	0.0	166	0.0	2.0	260
SO. ATL.	6.8	0.0	121.6	12.0	396	41.1	83.9	1.7	168	0.0	3.4	320
E. SO. CEN.	0.0	0.0	112.8	23.8	1,669	0.0	83.2	0.0	54	0.0	11.9	202
W. SO. CEN.	20.5	0.0	35.2	5.9	287	20.5	132.0	0.0	47	0.0	5.9	70
MOUNTAIN	40.2	0.0	160.8	8.0	6,624	24.1	80.4	8.0	265	0.0	0.0	354
PACIFIC	15.7	0.0	21.0	10.5	816	29.7	61.2	1.7	84	0.0	0.0	177
TOTAL	10.4	0.5	26.7	6.5	1,105	31.1	80.8	0.5	247	0.0	2.1	182

PLAGUE INFECTION IN CALIFORNIA AND WASHINGTON

Plague infection has been reported proved in specimens collected in California and Washington as follows:

CALIFORNIA

Monterey County.—March 30 and 31, in specimens of tissue and fleas from wood rats (*Neotoma fuscipes*), meadow mice (*Microtus californicus*), and mice (*Peromyscus* sp.) collected in Camp Hunter Liggett, Jolon, Monterey County, Calif., as follows: Tissue from 1 rat; 2 pools

of tissue from rats, one of which consisted of tissue from 4 rats from a collection of 41; tissue from 1 meadow mouse; a pool of 237 fleas from 76 rats; a pool of 100 fleas from 87 meadow mice; a pool of 21 fleas from 4 meadow mice; a pool of 50 fleas from 51 meadow mice; a pool of 234 fleas from 108 meadow mice; and a pool of 35 fleas from mice, 3 species of mice, *Peromyscus*.

WASHINGTON

Pierce County—Tacoma.—March 23, in tissue from 1 rat (*R. norvegicus*), and March 29, in a pool of 30 fleas from 76 rats, same species, all from frame buildings in industrial sections of Tacoma, Wash.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (human).—On April 11, one death from bubonic plague was reported in a woman 35 years of age, in the Hamakua District, Island of Hawaii, T. H. This is the third death from plague reported in the District since March 1, 1943.

Plague (rodent).—During the week ended March 27, 1943, 5 rats proved positive for plague were reported in Hamakua District, Island of Hawaii, T. H., as follows: 1 rat in Kapulena Area, 3 rats in Paauhau Area, and 1 rat in Honokaa Area.

DEATHS DURING WEEK ENDED APRIL 10, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Apr. 10, 1943	Corresponding week, 1942
Data for 88 large cities of the United States:		
Total deaths	9,464	8,620
Average for 3 prior years	8,559	
Total deaths, first 14 weeks of year	138,871	127,079
Deaths under 1 year of age	621	537
Average for 3 prior years	499	
Deaths under 1 year of age, first 14 weeks of year	9,698	7,870
Data from industrial insurance companies		
Policies in force	65,479,985	64,963,028
Number of death claims	13,330	11,810
Death claims per 1,000 policies in force, annual rate	10.6	9.5
Death claims per 1,000 policies, first 14 weeks of year, annual rate	10.7	10.2

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 20, 1943.—During the week ended March 20, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		20	2	147	210	33	19	13	44	488
Diphtheria		23	9	25		5			2	64
Dysentery (amebic)					1					1
Dysentery (bacillary)				15						16
German measles		1		22	34		1	4	5	67
Influenza		43	12		28	7	152		469	711
Measles		94	4	219	363	85	251	53	93	1,162
Meningitis, meningococcus			1	5	4	2	1		3	16
Mumps	1	204	5	97	1,068	118	94	103	152	1,842
Scarlet fever		3	56	118	185	24	36	45	21	488
Tuberculosis (all forms)	5	8	2	117	63	18	22	12		247
Typhoid and paratyphoid fever			1	30			1			32
Undulant fever								1		1
Whooping cough		3		93	150	63	19	12		340

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Peru.—For the month of February 1943, 4 cases of plague were reported in Peru as follows: Department of Lima, Huaura, 2; Department of Lambayeque, Chiclayo, 2.

Typhus Fever

Algeria.—For the period March 1–10, 1943, 373 cases of typhus fever were reported in Algeria, including 17 cases in Algiers, 13 cases in Azefon, 13 cases in Bone, 13 cases in Philippeville, 42 cases in Oran, and 10 cases in Mostaganem.

Guatemala.—For the month of February 1943, 101 cases of typhus fever were reported in Guatemala.

Hungary.—For the period March 21–27, 1943, 47 cases of typhus fever were reported in Hungary.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

THE PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 58 **APRIL 30, 1943** NUMBER 18

IN THIS ISSUE

Studies of the Acute Diarrheal Diseases

Species of Fleas Found in Western States

CONTENTS

Public Health Reports

Vol. 58 • APRIL 30, 1943 • No. 18

STUDIES OF THE ACUTE DIARRHEAL DISEASES

X A. CULTURAL OBSERVATIONS ON THE RELATIVE EFFICACY OF SULFONAMIDES IN *SHIGELLA DYSENTERIAE* INFECTIONS [1]

By ALBERT V. HARDY, *Surgeon (R)*, WILLIAM BURNS, *Associate Bacteriologist*, and THELMA DECAPITO, *Assistant Bacteriologist, United States Public Health Service*

The response of *Shigella dysenteriae* (Flexner and Newcastle) infections to sulfaguanidine was described in a previous communication.[2] In 68 treated cases, all but 6 were negative by the fourth day, and the last positive culture was on the tenth day. During the present study 501 cases or carriers were treated. At first only sulfaguanidine and sulfasuxidine were used, and 169 and 175 persons, respectively, were treated with these drugs. Later, sulfadiazine and sulfathiazole were included, 95 and 62 persons, respectively, receiving these preparations.

The cases and carriers were observed in nonexplosive outbreaks in New York State institutions. The varieties of *Shigella* found in three of these were, respectively, Flexner W, Flexner Z, and Sonne. In the fourth, Schmitz, Flexner W, and Sonne appeared in succession. For purposes of this analysis only those individuals were included who were culturally positive on the test immediately before the beginning of medication or, if negative on this test, with a preceding positive test within 3 days and a subsequent positive examination during the first 48 hours of treatment. The controls were similarly selected considering the day on which treatment would have been started. Fifty of the treated individuals were infected with Flexner W, 96 with Flexner Z, 177 with Sonne, and 178 with Schmitz. The Flexner Z infections were chiefly cases, the others chiefly carriers.

The outbreaks were confined largely to certain wards or buildings in which a relatively high percentage of the inmates became infected. Each unit housed individuals with the same general type of mental

[1] From the Divisions of Infectious Diseases and Public Health Methods, National Institute of Health Arrangements for this study were made through the New York State Departments of Health and Mental Hygiene.

[2] Hardy, A. V., Watt, James, Peterson, Jerome, and Schlosser, Elise: Studies of the acute diarrheal diseases. VIII. Sulfaguanidine in the control of *Shigella dysenteriae* infections. Pub. Health Rep., 57:529-535 (Apr. 10, 1942).

disorder or defect. Thus, comparatively homogeneous groups living under similar conditions and infected with a particular variety and strain of *Shigella* were treated in a uniform manner with different sulfonamides. The 4 preparations were prescribed in rotation for Flexner Z, for about one-half of the Sonne, and for 24 of the Schmitz cases. In the remainder of the Sonne and Schmitz infections, the different sulfonamides were assigned to comparable groups in the same institutions. Those treated with sulfaguanidine and sulfasuxidine for Flexner W were in different institutions.

Cases of acute diarrhea were reported each morning and specimens for culture were taken immediately; carriers were discovered by cultural surveys. Routinely, two examinations were obtained before treatment, one immediately prior to the first dose of medication. Those receiving sulfonamides were cultured daily. Treatment was terminated with the second successive negative plate and the daily cultures were discontinued following a third negative examination. Follow-up examinations were obtained through repeated surveys of all persons in the infected ward or building.

TABLE 1.—*Average colony*[1] *counts per S. S. agar plate (inoculated directly by rectal swabs from cases and carriers) by variety of* Shigella dysenteriae *and the type and duration of chemotherapy*

Number of days before and after beginning chemotherapy	Variety of *Shigella dysenteriae*													
	Flexner Z				Sonne					Schmitz				
	Sulfonamide compounds used in treatment													
	Guan	Sux	Diaz.	Thiaz	Guan.	Sux.	Diaz.	Thiaz	None	Guan	Sux	Diaz.	Thiaz	None
	Total number of cases and carriers													
	20	26	25	25	34	48	64	31	16	108	58	6	6	35
	Average colony counts per S. S. agar plate													
Before treatment: 0–3	444	242	338	330	477	588	565	526	393	511	547	421	317	328
After treatment:														
1	59	104	48	229	425	379	266	287	438	212	218	7	11	280
2	65	72	13	40	74	68	67	112	398	73	39	0	0	254
3	56	8	0	1	40	30	60	105	409	20	2	0	0	226
4	16	0	0	0	5	6	34	7	602	11	12	0	0	120
5	0	0	0	0	32	5	23	13	360	10	6	0	0	94

[1] Suspicious colorless colonies of which the picked representatives proved to be *Shigella dysenteriae*.

Guan. = sulfaguanidine
Sux. = sulfasuxidine.
Diaz = sulfadiazine
Thiaz. = sulfathiazole

Specimens were obtained by rectal swabs and were inoculated directly to S. S. (*Shigella–Salmonella*) agar plates. Suspicious colonies were counted or, if numerous, the approximate number was estimated. Representative colorless colonies were picked to Krum-

weide's triple sugar agar. One isolation from each individual was classified by detailed cultural and serological tests; the others were identified by limited cultural examinations and by serological tests.

The dosage of sulfaguanidine and sulfasuxidine given adults was an initial 10 gm. followed by 5 gm. three or four times daily; the initial dose of sulfadiazine and sulfathiazole was 4 gm. followed by 1 gm. three, four or, in one group, six times daily. Children (all weighing under 75 pounds) were given one-half of these doses. There were no infants in this series.

TABLE 2.—*The relative rapidity of action of the sulfonamides as indicated by the proportion of cases in which the colony*[1] *counts were reduced by more than one-half during the first 24 hours of chemotherapy*

	Variety of *Shigella dysenteriae*													
	Flexner Z				Sonne					Schmitz				
	Sulfonamide compound used in treatment													
	Guan.	Sux.	Diaz	Thiaz.	Guan	Sux.	Diaz	Thiaz.	None	Guan.	Sux	Diaz.	Thiaz.	None
Total number of cases	14	24	20	21	30	44	52	29	16	73	46	6	6	34
Cases in which counts were reduced by more than one-half in first 24 hours of treatment														
Number	9	12	16	11	12	21	34	13	2	48	33	6	6	5
Percent	64	50	80	52	40	48	65	45	13	66	72	100	100	15

[1] Suspicious colorless colonies of which the picked representatives proved to be *Shigella dysenteriae*
Guan = sulfaguanidine
Sux = sulfasuxidine
Diaz = sulfadiazine
Thiaz = sulfathiazole.

The response to treatment is shown in three tables. The average counts of suspicious colonies for the two examinations before medication and the daily cultures during treatment are recorded in table 1. Table 2 indicates the relative rapidity of the responses. This gives the number and percent of cases in which the counts at the end of 24 hours of treatment and on all subsequent tests were less than one-half of the pretreatment findings. Lastly, in table 3 the persistence of the infection is indicated. Here the individual was counted as infected through the day on which the last positive culture was obtained. The findings on Sonne and Schmitz control groups are included in all tables, and those for untreated Flexner and Newcastle cases, as previously reported, are shown in table 3.

A comparison of the control and treated series reveals that all four sulfonamides markedly modified the course of these *Shigella* infections. Under treatment cases and carriers were rarely positive for as long as 1 week, whereas those observed earlier in our studies before sulfonamides were being used were rarely negative at the end of 1 week.

TABLE 3.—*Percent of individuals with persisting positive cult ures by variety of* Shigella dysenteriae *and the type and duration of chemotherapy*

Number of days after beginning chemotherapy	Variety of *Shigella dysenteriae*																
	Flexner W		Flexner Z				Flexner & Newcastle	Sonne					Schmitz				
	Sulfonamide compound used in treatment																
	Guan.	Sux	Guan.	Sux.	Diaz	Thiaz	None	Guan	Sux	Diaz	Thiaz.	None	Guan.	Sux.	Diaz	Thiaz	None
	Total number of cases and carriers																
	7	43	20	26	25	25	29	34	48	64	31	16	108	58	6	6	35
	Percent of individuals with positive cultures																
0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1	100	61	70	54	60	52	90	79	85	89	81	94	75	60	17	33	97
2	100	40	50	23	32	8	90	74	54	56	65	94	52	24	0	0	91
3	14	16	35	19	12	8	90	38	29	36	48	94	30	14	0	0	86
4	0	5	35	12	0	4	86	21	10	20	39	87	15	7	0	0	86
5	0	2	10	4	0	4	86	12	6	17	26	75	9	3	0	0	77
6	0	0	5	0	0	0	86	9	6	16	16	69	7	2	0	0	66
7	0	0	5	0	0	0	86	9	4	11	10	63	4	2	0	0	66

Guan =sulfaguanidine.
Sux =sulfasuxidine
Diaz.=sulfadiazine.
Thiaz.=sulfathiazole.

All tests indicate that Sonne infection was less sensitive to the different sulfonamides than Flexner or Schmitz.

There were moderate variations only in the efficacy of the four sulfonamides. Considering all evidence, sulfasuxidine was more effective than sulfaguanidine, and sulfadiazine was better than sulfathiazole. The two readily absorbed sulfonamides were more effective than the two poorly absorbed preparations in Flexner Z infections. The four sulfonamides were compared in only the last 24 Schmitz infections. Sulfadiazine and sulfathiazole both gave better results than the other two. The character of the response in Sonne infections differed. By the end of the first 24 hours sulfadiazine had changed heavy infections to relatively light ones, though most of the cultures were still positive. In contrast, during this time colony counts were not reduced significantly by sulfaguanidine. At the end of the second and third days the response to sulfathiazole was least satisfactory, and there was slight variation in the cultural findings on the groups treated with the other three sulfonamides. Later than this the advantage was in favor of the poorly absorbed sulfonamides, particularly sulfasuxidine. Thus, in this series, sulfadiazine was the most effective in rapidly controlling the massive Sonne infections usually found in clinical cases but was less effective than sulfasuxidine in eradicating these organisms from convalescent and passive carriers.

The dosage of sulfadiazine and sulfathiazole was varied in Sonne infections. At first the stated dose was given three times daily. For the latter one-half of the cases the same amount was given six times daily. This did not modify appreciably the response to sulfadiazine but did appear to improve the results with sulfathiazole.

Infected individuals could be isolated only as a group, not individually. A reappearance of the infection after treatment, which was observed in a few cases, could be interpreted either as a recurrence or as a reinfection. An evaluation of treatment on the basis of the frequency of recurrences was not possible.

Symptoms were controlled by each of the four sulfonamides, but conditions were not favorable for the collection of the detailed clinical data needed for comparative studies.

No toxic reactions were reported, though minor disturbances might have occurred and remained undetected.

These cultural data reveal differences in the bacteriostatic action of the sulfonamides on *Shigella dysenteriae.* Sulfadiazine stood first in rapidity of action and would be judged the most promising for the treatment of clinical infections due to the varieties of *Shigella* encountered in this country. Sulfasuxidine was more effective than sulfaguanidine and was superior to sulfadiazine in convalescent and passive carriers of Sonne.

Preliminary observations on the clinical response to sulfadiazine are reported in the following paper of this series.

STUDIES OF THE ACUTE DIARRHEAL DISEASES

X B. A PRELIMINARY NOTE ON THE CLINICAL RESPONSE TO SULFADIAZINE THERAPY [1]

By Albert V. Hardy, *Surgeon (R), United States Public Health Service*, and Sam D. Cummins, *Resident in Pathology and Medicine, Shreveport Charity Hospital*

The cultural observations reported in the preceding paper of this series indicate that sulfadiazine is a somewhat more effective bacteriostatic agent than sulfathiazole, sulfasuxidine, or sulfaguanidine for the varieties of *Shigella dysenteriae* encountered in this country. As comparative clinical data could not be obtained in that study which was limited to institutional inmates, a separate investigation was undertaken on mentally normal individuals with severe acute diarrheal disease. The first cases were all given sulfadiazine. Additional treatment included fluids for dehydration, and mild sedatives for restlessness and cramps. The findings on the 21 cases observed during September and October 1942 are reported here.

---

[1] From the Division of Infectious Diseases, National Institute of Health, and the Shreveport Charity Hospital, Shreveport, La.

The color, sex, and age of the patients are given in table 1. There was a wide range in age—eight under 1 year, five between 1 and 4 years, and eight adults.

TABLE 1.—*Color, sex, and age of patients, nature of the cases of acute diarrhea which were treated with sulfadiazine, and clinical and bacteriological response to treatment*

Patient	Color	Sex	Age	Diagnosis as to etiology	Severity on admission	Duration on admission	Temperature			
							Before treatment	During treatment after—		
								12 hrs.	24 hrs.	48 hrs.
N. L.	W	F	6 mo.	Flexner	Moderate	1 wk.	99.4	98	N	N
K. S.	W	M	8 mo.	do	do	10 dy.	101.4	N	N	N
B. S.	C	M	8 mo.	do	Severe	5 dy.	102	99	99.8	101.6
T. L.	W	F	9 mo.	do	do	3 dy.	104.8	102.4	N	N
L. W.	C	M	11 mo.	do	Critical	6 dy.	102.8	100	N	N
R. S.	C	M	1 yr.	do	Severe	24 hr.	105.8	100.6	N	N
A. B.	C	F	2 yr.	do	do	12 hr.	105.2	101	100.6	N
T. W.	W	M	18 yr.	do	do	4 dy.	99.4	99	N	N
L. R.	C	F	64 yr.	do	do	3 dy.	102	99	99.2	N
B. B.	C	M	64 yr.	do	do	7 dy.	100.4	99.8	N	N
E. M.	C	F	18 mo.	Sonne	do	8 hr.	104.6	N	N	N
H. H.	C	F	2 yr.	do	Moderate	14 hr.	104.8	100.8	N	N
H. H.	W	M	38 yr.	do	do	8 mo.	N	N	N	N
R. W.	C	F	65 yr.	do	do	2 dy.	100	N	N	N
A. W.	W	M	11 mo.	Bacillary dysentery	Critical	2 dy.	103.2	N	N	N
O. A.	C	F	4 yr.	do	Mild	14 dy.	N	N	N	N
J. B.	C	F	20 yr.	do	do	4 dy.	102.2	98.4	100.4	N
L. R.	C	M	42 yr.	do	Moderate	2 dy.	100.4	N	N	N
D. B.	C	F	3 mo.	Unknown	Critical	3 dy.	101.8	99.6	100	N
B. G.	W	M	4 mo.	do	do	3 dy.	101.4	101	102.6	100.2
A. G.	C	M	45 yr.	do	do	2 dy.	100.6	N	N	N

Number of stools in 24 hrs		Counts of suspicious colonies per S S agar plate						Patient
Before treatment	During second day of treatment	Before treatment	During the specified day of treatment					
			1	2	3	4	5	
Every half hour	1	1000	10	0	0	0	0	(N. L.)
6 to 8	N	500	0	0	0	----	----	(K. S.)
Many	N	No culture	4	0	0	0	0	(B. S.)
Numerous	8	do	75	0	0	0	0	(T. L.)
12	4	No count	----	----	----	----	----	(L. W.)
Many	N	Overgrown	25	Very few	0	0	----	(R. S.)
Every 2 hours	N	No count	----	----	----	----	----	(A. B.)
Numerous	N	1000's	3	2	4	4	3	(T. W.)
Do	N	1000's	6	0	0	0	0	(L. R.)
Do	12	1000's	200	25	1	0	0	(B. B.)
Hourly	N	1000's	1000	0	0	----	----	(E. M.)
Few	N	1000's	500	1000	50	0	0	(H. H.)
14	3	1000	Overgrown	Overgrown	200	500	0	(H. H.)
10	N	1000's	500	50	8	1	2	(R. W.)
Hourly	4	0	0	0	0	----	----	(A. W.)
Every 30 minutes	N	0	0	0	0	----	----	(O. A.)
7	N	0	0	0	0	----	----	(J. B.)
Continuous	N	0	0	0	0	----	----	(L. R.)
Unknown	N	0	0	0	0	----	----	(D. B.)
7	7	0	0	0	0	----	----	(B. G.)
Continuous	3	0	0	0	0	----	----	(A. G.)

The etiology was determined by positive cultures in 14 cases as shown in the table. The diagnosis of bacillary dysentery was accepted on clinical and epidemiological grounds in 4 others. In 3, the cause of the diarrhea was not discovered. On admission, 5 patients were

in a critical condition, 8 were severely ill, 6 moderately so, and 2 mildly ill. The last two were admitted late, apparently at the beginning of convalescence. The illnesses had persisted from 8 hours to 1 week in 19 cases, for 2 weeks in one case, and there had been recurrent attacks for 8 months in one case.

The response to treatment is indicated in table 1 by the temperature, numbers of stools, and the *Shigella dysenteriae* colony counts before medication and at stated intervals during treatment. The temperatures of children under 5 years of age were taken by rectum, of others by mouth. It is recorded as normal (N) when the particular reading and the following ones did not exceed 99° F. by mouth or 100° F. by rectum. All temperatures due to uncomplicated *Shigella* infections were normal at 48 hours (B. S. had a concurrent otitis media), and all but three at 24 hours. The majority were reduced to low grade elevations within 12 hours.

The diarrhea was severe before treatment in most of the cases, though a statement of the number of stools was not always obtainable. During the first 24 hours of medication there was a rapid decline in the number of watery fecal stools. The response was slower in those with bloody muco-purulent discharges and, presumably, extensive ulcerations. During the second day of treatment and subsequently, 14 (67 percent) had normal stools with at most two movements which were free of gross exudate (recorded "N" in table). The remaining 7 had from 3 to 12 stools on the second day but in these there was a return to normal on the third, fourth, or fifth days of treatment.

The general clinical condition improved with the decline in temperature and the reduction in number of stools. It required time to overcome the severe dehydration observed in the children. In adults, abdominal cramps were sometimes annoying up to the third or fourth day of treatment. However, the critically ill infants and the very uncomfortable adults showed marked improvement within 6 to 12 hours, and all progressed to an uneventful recovery.

Stool cultures were positive in 14 cases, but in 2 of these the pretreatment specimen was not obtained and in 2 the daily swabs were not taken. The cultures with thousands (recorded "1000's" in table) of colonies per plate usually had areas of confluent clear growth and very many small, colorless colonies. This evidence of a massive infection soon disappeared with treatment as is shown in the table.

One patient (B. S.) with proved bacillary dysentery had concurrently an otitis media. There may have been a respiratory infection in the two infants in whom the cause of the diarrhea was unknown. An advantage of sulfadiazine in these diseases is its effectiveness in parenteral infections which may account for diarrhea.

515736°—43——2

A review of cases of comparable severity treated with sulfaguanidine during the preceding year revealed that the clinical response had been slower and less consistent.

The prevailing medical opinion favors the use of poorly absorbed sulfonamides for the treatment of bacillary dysentery and other clinically similar diarrheal disorders. The cultural and clinical findings reported in this and the preceding paper of the series indicate that sulfadiazine is a promising chemotherapeutic agent for these enteric diseases. In selecting sulfonamides for clinical trial or for critical evaluation the readily absorbed sulfonamides as well as the poorly absorbed preparations must be considered.

STUDIES OF THE ACUTE DIARRHEAL DISEASES

XI. THE TYPING OF *SHIGELLA DYSENTERIAE* FLEXNER[1]

By Albert V. Hardy, *Surgeon (R)*, James Watt, *Passed Assistant Surgeon*, and Thelma DeCapito, *Junior Bacteriologist, United States Public Health Service*

The members of the *Shigella dysenteriae* group of organisms are usually identified serologically by polyvalent antiserums and typed by agglutinin absorption. The first has limited value in epidemiological work as it does not distinguish between varieties; the latter is a laborious and time-consuming technique.

The agglutination procedure described below has been used in our laboratories for 5 years and has been an essential part of our method of study. It is based primarily on the V, W, X, Y, and Z classification of Andrewes and Inman (*1*). Later work (*2*) has shown that there are probably only three valid types in this group of five but this has not affected the usefulness of the method. (An organism has never been encountered which would be classed as X or Y by this method.) Early in the use of the test it was found that the agglutination by the Y antiserum did not contribute to the interpretation of results and it is no longer used.

TECHNIQUE

1. High titre antiserums are prepared by inoculation of rabbits with Flexner types V, W, X, and Z. Stock cultures used were obtained from the Bureau of Standards Laboratory, Oxford, England. High titre serums (1–6400 and up) are desirable since they usually provide a sharp endpoint in a titration. The method of production described by Havens (*3*) has been satisfactory in our experience.

2. Antigens, both stock and unknown, are grown on beef infusion agar for 24 hours, then suspended in formalized saline (0.5 percent

[1] From the Division of Infectious Diseases, National Institute of Health.

formalin) and adjusted to the turbidity of MacFarland's nephelometer, tube No. 3.

3. The antiserums are diluted in geometric progression on the day they are to be used. This is done in a series of glasses or large test tubes to assure uniformity of dilution.

4. 0.5 cc. of each dilution of the four antiserums is added to 0.5 cc. of antigen, shaken, incubated at 56° for 4 hours, and left overnight at room temperature before reading.

In our work it has been convenient to use six dilutions of each antiserum. A larger or smaller number may be used but it would not be safe to use less than five dilutions because of the variation in agglutinability of different strains. The fifth tube of each six-tube set-up represents the titre of the serum. Using high titre serum and perfect technique, the reading of the control, which is done with each day's run of unknowns, would be 444440. Actually some slight variation from this occurs and the readings of unknowns are adjusted according to whether the control is below or above this standard. Thus if the V control reads 444420, all readings for unknowns against the V antiserum on that day are increased by an equivalent amount. If the control should be higher, the readings are correspondingly decreased. By using this adjusted reading, the results of one day are comparable with the results of any other day and with a standard.

APPLICATION AND INTERPRETATION

Two conditions should be met if this test is to serve as a substitue for agglutinin absorption: (1) It must separate satisfactorily the Flexner group into varieties. (2) These varieties must be easily and accurately identified according to the nomenclature currently in use.

The first, actually of greatest epidemiological importance, was easily confirmed. The great majority of the Flexner organisms were found to possess one of three distinctive "agglutination patterns." In addition, two other patterns have been recognized which are apparently distinctive (table 1). These patterns have been quite constant in organisms isolated from the same individuals and their family contacts, as well as in several epidemics whose common source was indicated by investigation.

The second condition was checked by agglutinin absorption tests done on representative organisms by the more recently described polysaccharide precipitin test (*4*, *5*) and by a comparison of the biochemical reactions of all organisms studied (table 1). The first three patterns were easily identified with the V, W, and Z types of Andrewes and Inman by both absorption and precipitin tests. Organisms in the other two groups have been identified by absorption as W and Z, respectively. This test failed to distinguish between the two W and Z types.

The precipitin tests did indicate differences but it is not yet certain whether these are constant. Biochemically there were usually differential characteristics (table 1).

TABLE 1.—*Agglutination patterns of different types of* Shigella dysenteriae *Flexner and biochemical properties which aid in differentiation*

Type designation	Type by— Agglutinin absorption	Type by— Polysaccharide[1] precipitin	Antiserums	"Agglutination patterns"[3] Typical agglutination	Variations in agglutination		
V	V	V	V	4 4 4 4 4 0	4 4 4 0 0 0	4 4 4 4 4 0	4 4 4 1 4 2
			W	4 4 4 0 0 0	4 0 0 0 0 0	4 4 4 0 0 0	4 4 4 0 0 0
			X	4 4 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0
			Z	4 4 4 4 0 0	4 4 2 0 0 0	4 4 4 4 4 0	4 4 4 4 4 0
W	W	W	V	4 0 0 0 0 0	0 0 0 0 0 0	4 4 0 0 0 0	0 0 0 0 0 0
			W	4 4 4 4 4 0	4 4 4 4 0 0	4 4 1 4 4 4	4 4 4 4 4 4
			X	2 0 0 0 0 0	0 0 0 0 0 0	4 0 0 0 0 0	0 0 0 0 0 0
			Z	0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0
Z	Z	Z	V	4 4 4 4 0 0	4 4 4 0 0 0	4 4 4 4 4 0	4 1 2 0 0 0
			W	2 0 0 0 0 0	0 0 0 0 0 0	4 4 2 0 0 0	0 0 0 0 0 0
			X	4 4 4 2 0 0	4 4 2 0 0 0	4 4 4 4 0 0	1 4 4 2 0 0
			Z	4 4 4 4 4 0	4 4 4 4 0 0	4 4 4 4 4 4	4 4 4 4 4 4
W′	W	W[2]	V	4 4 4 2 0 0	4 2 0 0 0 0	4 4 4 4 4 1	4 4 1 0 0 0
			W	1 4 1 4 3 0	4 4 3 0 0 0	4 4 4 4 4 1	4 4 4 2 0 0
			X	4 4 4 1 0 0	4 1 0 0 0 0	4 4 4 4 4 1	4 4 1 0 0 0
			Z	4 4 2 0 0 0	1 0 0 0 0 0	4 4 1 4 2 0	4 0 0 0 0 0
Z′	Z	Z[2]	V	4 4 4 0 0 0	4 4 2 0 0 0	4 4 4 4 0 0	4 2 0 0 0 0
			W	4 4 4 4 0 0	4 4 4 2 0 0	4 4 4 4 2 0	4 4 1 2 0 0
			X	4 4 2 0 0 0	4 4 2 0 0 0	4 4 4 4 0 0	4 4 0 0 0 0
			Z	4 4 4 4 4 0	4 4 4 4 2 0	4 4 4 4 4 0	4 4 4 4 4 4

BIOCHEMICAL REACTIONS WITH DIFFERENTIAL VALUE

Type	Indol reaction	Fermentation of Mannitol	Fermentation of Rhamnose	Character of antigen
V	Variable, usually negative to moderate, rarely strong	+	−	Easy to keep smooth on artificial media
W	Variable, usually slight to moderate, rarely strong.	+	−	Easy to keep smooth on artificial media.
Z	Strong	+	Frequently late (2–14 days).	Easy to keep smooth on artificial media.
W′	Strong	Frequently late (2–14 days)	−	Rough variants very common, suspension hard to prepare
Z′	Variable, slight to moderate, rarely strong.	+	−	Easy to keep smooth on artificial media.

[1] Precipitin tests done by Luis M Gonzales, School of Tropical Medicine, San Juan, P R.
[2] Slightly atypical in their reaction Further study being conducted
[3] Serum dilutions adjusted so the end point for the homologous organism is at the second to the last tube. Figures represent the amount of agglutination.

Accurate interpretation will be facilitated if the following considerations are kept in mind:

1. The pattern is the important factor. Frequently the reading of an individual titration will show a reaction lower than the typical pattern, but this is almost always uniform, i. e., a corresponding lack

of sensitivity is found against all serums. Sample variations in the readings taken from our records are shown (table 1). As can be seen, whether the reading is higher or lower than normal, the pattern persists.

2. Sometimes the dilution of the serum may be such that the standard gives a reading much lower than the ideal of 444440. Usually this causes no difficulty in adjustment. Occasionally a day's readings will give a series of patterns which cannot be interpreted, and the whole series must be repeated. This can be avoided only by careful and regular titration of the antiserums against the control organisms and care in making the original dilutions of the serums.

3. In differentiating V and Z types, variations in the reactions in W and X antiserums are often of more significance than the differences between V and Z. The titers for the latter may be almost the same. A W titer higher than X indicates a V organism, and the reverse a Z.

4. Reference to the biochemical variations assists in interpretation. No one factor is conclusive, but taken together they aid substantially. The indol reaction is particularly useful (table 1).

Uncertainty in results not infrequently has been traced to faulty technique as, for example, when the stock strain developed rough variants. A few organisms still remain in the unclassified group, but with increasing experience these have steadily decreased. During the past year in Puerto Rico, unclassified strains were less than 0.5 percent of those studied.

This method has been used in four widely separated areas—New Mexico, Georgia, New York, and Puerto Rico—and in all it has been possible to classify satisfactorily the great majority of organisms isolated. The technique is much simpler than agglutinin absorption. It also has greater epidemiological value, since it revealed five varieties instead of the three which were indicated by the more laborious procedure.

REFERENCES

(*1*) Andrewes, F. W., and Inman, A. C.: A study of the serological races of the Flexner group of dysentery bacilli. Medical Research Committee (Great Britain). Special Report Series No. 42. London, 1919.

(*2*) Boyd, J. S. K.: Laboratory diagnosis of bacillary dysentery. Trans. Roy. Soc. Trop. Med. & Hyg., **33**: 553–571 (1940).

(*3*) Havens, L. C.: The bacteriology of typhoid, *Salmonella*, and dysentery infections and carrier states. Commonwealth Fund, New York, 1935.

(*4*) Spasskiy, N. N., and Danenfelt, L. A.: Experimental preparation of specific polysaccharides of dysenteric bacteria. Bull. biol. et méd. expér URSS, **7**: 202–205 (1939).

(*5*) Gonzáles, L. M., and Morales Otero, P.: A rapid method for the determination of races of *Shigella dysenteriae* Flexner. Proc. Soc. exper. biol. & med., **51**: 94–95 (1942).

SPECIES OF FLEAS ON RATS COLLECTED IN STATES WEST OF THE 102D MERIDIAN AND THEIR RELATION TO THE DISSEMINATION OF PLAGUE

By FRANK M. PRINCE, *Assistant Entomologist, United States Public Health Service*

For several years the United States Public Health Service has conducted investigations to determine the extent and distribution of plague infection among rodents in the western States. The present study concerns the species of fleas found on 4,188 rats collected by trapping and shooting during a 6-year period (1935–1941) in rural areas and cities located west of the 102d meridian in 13 States.

The study indicates that rats are widely distributed throughout the area covered. The rats taken included the three common species, *Rattus norvegicus*, *Rattus rattus*, and *Rattus alexandrinus*. One or more of each of the three species were found in each of the 13 States. From the 4,188 rats a total of 5,785 fleas was taken.

The fleas included the 3 species commonly found on rats in coastal cities of the United States (*1*): *Xenopsylla cheopis*, *Nosopsyllus fasciatus*, and *Leptopsylla segnis*. In addition, 18 other species of fleas were collected. The various species represented are listed below:

ALPHABETICAL LIST OF FLEAS FOUND ON RATS TAKEN WEST OF THE 102D MERIDIAN

Anomiopsyllus sp. (Baker)
Ctenocephalides canis (Curtis)
Ctenocephalides felis (Bouche)
Diamanus montanus (Baker)
Echidnophaga gallinaces (Westwood)
Foxella ignotus (Baker)
Hoplopsyllus anomalus (Baker)
Leptopsylla segnis (Duges)
Malaraeus telchinum (Roths)
Megabothris abantis (Roths)
Megabothris lucifer (Roths)
Monopsyllus wagneri (Baker)
Nosopsyllus fasciatus (Bosc)
Opisocrostis labis (J & R)
Orchopeas nepos (Roths)
Orchopeas sexdentatus (Baker)
Oropsylla rupestris (Jordan)
Thrassis fotus (Jordan)
Thrassis howelli (Jordan)
Thrassis petiolatus (Baker)
Xenopsylla cheopis (Roths)

The close association between rats and field rodents which has been observed around human habitations in rural areas and around city garbage dumps, and the occasional use of field rodent burrows by rats, probably accounts for the finding of most of the fleas belonging to species not ordinarily regarded as rat fleas. While numerous observations have led to the conclusion that most species of fleas exercise considerable discrimination in selecting a host, it is well established that some species are able to thrive and reproduce when provided with hosts other than those which they normally inhabit.

The species and number of rats and fleas included in the study are recorded in table 1 according to the State, locality, and type of

environment in which the rat host was found. Since the collections of fleas were made primarily for the detection of plague, it was impractical to classify the total number obtained. Therefore, the number from each locality which was classified and that which was examined for infection by inoculation into animals is also included in the table.

TABLE 1.—*Species and number of rats and fleas collected west of the 102d meridian, by State, locality, and type of environment in which found*

ARIZONA—1 SPECIES

Location	Environment	Host: Species	Host: Number	Fleas: Classification	Fleas: Number classified	Fleas: Number inoculated	Fleas: Total
Prescott	Packing company	A	1	None	0	0	0
Phoenix	Stores, markets	R A	11 20	*Xenopsylla cheopis*	9	0	9
Tucson	Garbage dump	N	26	None	0	0	0
Nogales	Buildings	N	89	*Xenopsylla cheopis*	1	0	1

CALIFORNIA—10 SPECIES

Location	Environment	Host: Species	Host: Number	Fleas: Classification	Fleas: Number classified	Fleas: Number inoculated	Fleas: Total
Costa Mesa	Hog ranch	A R	1 1	*Hoplopsyllus anomalus* *Echidnophaga gallinacea* *Orchopeas nepos* *Leptopsylla segnis*	1 14 8 4	0	27
Santa Ana	do	A	1	None	0	0	0
Jamu	do	A R	4 2	*Leptopsylla segnis*	8	0	8
Fresno	Markets	A N	9 3	*Xenopsylla cheopis* *Leptopsylla segnis* *Diamanus montanus* *Echidnophaga gallinacea*	12 36 1 33	0	82
Modesto	Slaughterhouse	A	1	*Nosopsyllus fasciatus*	3	0	3
San Diego	Garbage dump, Zoo, packing company, chicken yard, elevator	N R	40 2	*Xenopsylla cheopis* *Leptopsylla segnis* *Nosopsyllus fasciatus* *Echidnophaga gallinacea* *Ctenocephalides canis*	350 7 4 20 1	0	382
Riverside	Hog ranch	N R	11 5	*Xenopsylla cheopis* *Echidnophaga gallinacea*	1 33	0	34
Palm City	do	N	22	*Xenopsylla cheopis* *Leptopsylla segnis* *Echidnophaga gallinacea* *Foxella ignotus* *Ctenocephalides felis*	57 4 38 2 1	0	102
Chula Vista	do	N	9	*Xenopsylla cheopis* *Leptopsylla segnis* *Echidnophaga gallinacea*	2 5 2	0	9

Table 1.—*Species and number of rats and fleas collected west of the 102d meridian, by State, locality, and type of environment in which found*—Continued

CALIFORNIA—10 SPECIES—continued

Location	Environment	Host		Fleas			
		Species	Number	Classification	Number classified	Number inoculated	Total
Berkeley	Dwelling	N	4	*Nosopsyllus fasciatus* *Leptopsylla segnis*	15 11	0	26
Oroville	Markets	N	11	*Xenopsylla cheopis* *Nosopsyllus fasciatus*	86 8	177	271
Chico	Garbage dump	N	45	*Xenopsylla cheopis**	62	62	62
Walnut Grove	do	N	24	*Nosopsyllus fasciatus* *Diamanus montanus*	7 1	0	8
Stockton	Markets, office building	N	33	*Xenopsylla cheopis* *Diamanus montanus*	140 1	0	141
Red Bluff	Markets	N	11	*Xenopsylla cheopis*	10	25	35
Colusa	Stores, dairy	N	104	*Xenopsylla cheopis* *Nosopsyllus fasciatus*	15 18	90	123
Williams	Cafe	N	2	*Leptopsylla segnis*	2	0	2
Maxwell	Ranch	N	1	*Nosopsyllus fasciatus*	1	0	1
Willows	Slaughterhouse, packing company, cheese factory.	N	41	*Nosopsyllus fasciatus* *Echidnophaga gallinacea*	2 9	26	37
Orland	Ranch	N	8	*Nosopsyllus fasciatus*	1	1	2
Nicolaus	do	N	16	*Nosopsyllus fasciatus* *Leptopsylla segnis*	4 6	27	37

COLORADO—4 SPECIES

Location	Environment	Host		Flea			
		Species	Number	Classification	Number classified	Number inoculated	
Fort Collins	Ranch, garbage dump, alley way	N	44	*Nosopsyllus fasciatus*	107		
Denver	Garbage dump, alley way.	N	703	*Xenopsylla cheopis* *Nosopsyllus fasciatus*	45 20	1,089	1,154
Walsenburg	Ranch	N	4	*Monopsyllus wagneri* *Anomiopsyllus sp.*	5* 2*		
Edgewater	Garbage dump	N	35	*Nosopsyllus fasciatus*			31
Limon	Grain elevators	N	8	*Nosopsyllus fasciatus*			15
Springfield	Ranch	N	2	None			
Fort Morgan	Garbage dump	N	114	do			

Table 1.—*Species and number of rats and fleas collected west of the 102d meridian, by State, locality, and type of environment in which found*—Continued

IDAHO—3 SPECIES

[illegible]	[illegible] markets, hotel, ranch.	N	241	[illegible] *Monopsyllus wagneri*	[illegible] 1	209	272
St Maries	Ranch, stores	N	5	*Thrassis petiolatus*	1	0	1

MONTANA—7 SPECIES

Location	Environment	Host		Fleas			
		Species	Number	Classification	Number classified	Number inoculated	Total
Lewiston	Garbage dump, ranch, refinery	N	91	*Oropsylla rupestris* *Megabothris abantis* *Megabothris lucifer* *Orchopeas sexdentatus* *Opisocrostis labis*	2 1 1 1 1	0	6
Moore	Grain elevator	N	23	*Oropsylla rupestris* *Monopsyllus wagneri*	1 1	0	2
Acerville	Residence	N	29	*Megabothris* [illegible]*ifer*	1	0	1
Hobson	Grain elevator	N	28	None	0	0	0
Benchland	do	N	15	*Megabothris lucifer*	1	0	1
Sidney	Garbage dump, ranch, cafe	N	97	*Nosopsyllus fasciatus*	14	69	83
Savage	Ranch, residence	N	36	*Nosopsyllus fasciatus**	4	4	4
Fairview	Ranch	N	2	None	0	0	0

NEBRASKA—2 SPECIES

Location	Environment	Host		Fleas			
		Species	Number	Classification	Number classified	Number inoculated	Total
Chadron	Slaughterhouse	N	73	*Nosopsyllus fasciatus**	2	2	2
Alliance	Grain elevators	N	120	*Thrassis fotus* *Nosopsyllus fasciatus**	1 4	4	5
Sidney	Garbage dump	N	79	*Nosopsyllus fasciatus**	122	122	122

TABLE 1.—*Species and number of rats and fleas collected west of the 102d meridian, by State, locality, and type of environment in which found*—Continued

NEVADA—1 SPECIES

Location	Environment	Host		Fleas			
		Species	Number	Classification	Number classified	Number inoculated	Total
Reno	Packing company store, markets.	A	28	*Nosopsyllus fasciatus**	13	13	13
Sparks	Ranch	A	12	*Nosopsyllus fasciatus**	2	2	2

NEW MEXICO—4 SPECIES

Location	Environment	Host		Fleas			
		Species	Number	Classification	Number classified	Number inoculated	Total
Las Cruces	Ranch, market	A	26	*Echidnophaga gallinacea*	6	4	10
Lordsburg	Restaurant	A	37	*Xenopsylla cheopis* *Leptopsylla segnis*	23 3	0	26
Albuquerque	Garbage dump, warehouse, packing company.	N	214	*Xenopsylla cheopis* *Nosopsyllus fasciatus* *Echidnophaga gallinacea*	7 15 19	318	359
Los Lunas	Ranch, store	N	19	*Nosopsyllus fasciatus*	8	0	8
Chanez	Ranch	N	1	None	0	0	0
Roswell	do	N	17	*Echidnophaga gallinacea*	10	704	714
Clayton	Garbage dump	N	85	None	0	3	3
State Line	Ranch	N	12	*Nosopsyllus fasciatus**	4	4	4

OREGON—6 SPECIES

Location	Environment	Host		Fleas			
		Species	Number	Classification	Number classified	Number inoculated	Total
Corvallis	Garbage dump	N	16	*Nosopsyllus fasciatus*	3	0	3
Astoria	do	N	17	None	0	0	0
Marshfield	Garbage dump, creamery.	N	38	*Nosopsyllus fasciatus* *Leptopsylla segnis*	17 5	25	47
Reedsport	Creamery	N	1	None	0	0	0
Roseburg	Garbage dump	N	78	*Nosopsyllus fasciatus* *Malaraeus telchinum* *Orchopeas sexdentatus* *Diamanus montanus*	6 2 1 1	16	26

Table 1.—*Species and number of rats and fleas collected west of the 102d meridian, by State, locality, and type of environment in which found*—Continued

OREGON—6 SPECIES—continued

Location	Environment	Host		Fleas			
		Species	Number	Classification	Number classified	Number inoculated	Total
Eugene	do	N	90	*Nosopsyllus fasciatus* *Diamanus montanus*			
Newport	Garbage dump, hotel	N R	3 1	*Nosopsyllus fasciatus*	2	2	4
Albany	Packing company, garbage dump.	N	8	None	0	0	0
Salem	Store	N	5	do			
Arlington	Ranch	N	2	do			
The Dalles	Garbage dump	N	9	*Nosopsyllus fasciatus* *Diamanus montanus*			
McMinnville	do	N	30	*Ctenocephalides canis*			
Olex	Ranch	N	1	None			
Hood River	Garbage dump	N	6	None			0
Lexington	Warehouse	N	5	*Nosopsyllus fasciatus*			15

TEXAS—3 SPECIES

Location	Environment	Host		Fleas			
		Species	Number	Classification	Number classified	Number inoculated	Total
Newman	Ranch	A	1	*Nosopsyllus fasciatus** *Echidnophaga gallinacea**	2 1	3	
El Paso	Store, hotel, warehouses.	A	80	*Diamanus montanus*	3	18	21
Amarillo	Grain elevator, dance hall	N	47	*Nosopsyllus fasciatus**	8	8	8

UTAH—3 SPECIES

Location	Environment	Host		Fleas			
		Species	Number	Classification	Number classified	Number inoculated	Total
Salt Lake City	Store, dairy, market, garbage dump, stock yards.	A N R	22 242 31	*Xenopsylla cheopis* *Nosopsyllus fasciatus*	475 3	67	545
Provo	Garbage dump	N	53	*Nosopsyllus fasciatus*			10
Payson	do	N	28	*Nosopsyllus fasciatus*			22

TABLE 1.—*Species and number of rats and fleas collected west of the 102d meridian, by State, locality, and type of environment in which found*—Continued

WASHINGTON—5 SPECIES

Location	Environment	Host		Fleas			
		Species	Number	Classification	Number classified	Number inoculated	Total
Everett	Garbage dump	N	180	*Xenopsylla cheopis*	60	43	103
Spokane	Garbage dump, ranch market.	N	36	*Nosopsylla fasciatus* *Monopsyllus wagneri*	25 1	22	48
Cheney	Garbage dump, ranch, slaughterhouse	N	34	*Nosopsyllus fasciatus*	4	80	84
Spangle	Garbage dump, residence	N	12	*Nosopsyllus fasciatus*	11	16	27
Plaza	Grain elevators	N	6	*Nosopsyllus fasciatus*	5	67	72
Seattle	King Street	N	1	*Xenopsylla cheopis* *Leptopsylla segnis* *Ctenocephalides felis*	16 6 2	0	24
Medical Lake	Garbage dump	N	229	*Nosopsyllus fasciatus**	305	305	'05
Marshall	Ranch	N	!	None	0	7	7

WYOMING 2 SPECIES

Location	Environment	Host		Fleas			
		Species	Number	Classification	Number classified	Number inoculated	Total
Sheridan	Garbage dump	N	15	None	0	0	0
Fort McKenzie	do	N	76	*Nosopsyllus fasciatus* *Thrassis howelli*	1 1	0	2
Cheyenne	do	N	19	None	0	7	7

A = *Rattus rattus alexandrinus.*
N = *Rattus norvegicus.*
R = *Rattus rattus rattus.*

*Fleas classified in salt solution before their inoculation into animals for the detection of plague.

All three species of rats represented are highly susceptible to infection with plague under natural conditions. Transmission of plague in septicemic form to man occurs when a flea feeds upon an infected rat during the septicemic stage of the disease, and subsequently bites the human being within the period during which the flea is capable of transmitting the infection.

On the basis of the data in table 1, it would seem that *R. norvegicus* is the most prevalent species. This species was found in 12 of the States surveyed and in greater number than the other species. Nevertheless, *R. rattus* and *R. alexandrinus* were taken in several localities. The procedure followed in the surveys may have resulted in fewer rats of these species being taken; complete surveys were not made of buildings or other harborages since the purpose of the study was to

obtain a sample of the local rat population in order to determine if it was infected with plague.

X. cheopis is regarded thoughout the world as the most efficient vector of plague from rat to rat. It has readily attacked man and various species of rodents under experimental conditions. This flea was found in the interior of 5 of the States surveyed and in the coastal cities of 2 States. In view of its extensive distribution and its adaptability to a variety of hosts *X. cheopis* must be recognized as an important factor in considering the possibility of widespread dissemination of plague. Another species, *N. fasciatus*, has not received so much attention as *X. cheopis*. Nevertheless, it too is an efficient vector of plague. It was found to be even more widely distributed than *X. cheopis*, occurring in 12 of the 13 States surveyed.

Under experimental conditions, single fleas of each of these species have been observed to infect three or four animals in one day (*2*). Single specimens of some species of field rodent fleas also have been observed to infect more than one animal bitten under experimental conditions. Probably these fleas are also efficient vectors under natural conditions.

It should be borne in mind that the number of fleas collected from animals is not a reliable index of the number present in or around burrows and other places frequented by rodents.

Nine of the species of fleas collected, including the two common rat fleas, *X. cheopis* and *N. fasciatus*, have been found capable of transmitting plague under experimental conditions by biting hosts on which they do not occur in nature (*2, 3*). Five other species, including a third flea common to rats (*Leptopsylla segnis*), did not transmit the infection under the conditions of the test although they were proved to be infected (*2*). A specimen of one species, *Echidnophaga gallinacea*, is reported to have been infected at the time it was taken from a burrowing owl (*4*). The infectibility or infectiousness of the remaining six species has not been reported.

Plague was not found in the rats collected during the surveys here considered. Nevertheless, plague has been demonstrated in wild rodents, or in fleas from wild rodents, taken in 11 of the 13 States covered by this study. The presence of infected wild rodents and of ectoparasitic vectors which adapt themselves to various hosts affords an opportunity for the transmission of plague to rats. It has been shown that city rats migrate as far as 4 miles within a period of 2 weeks (*5*). Therefore, contact between urban rats and rodents of the fields and woods is feasible.

It should be noted that isolated specimens of plague-infected *R. norvegicus* were discovered in 1941 in the San Francisco Bay region of California. This was the first year since 1908 that an infected rat had been discovered in San Francisco, in spite of the fact that thou-

sands of rats were examined each year. Animal inoculation tests have also demonstrated plague recently in several collections of fleas taken from rats in this region. Similar tests disclosed plague in fleas collected from rats taken in Tacoma, Wash., in October 1942, and since that date infected fleas and rat tissues have been detected with increasing frequency. These facts may indicate that ectoparasitic vectors are finding their way from infected wild rodents to rats in or near centers of population in these coastal areas.

Surveys conducted by the United States Public Health Service and State health departments have demonstrated the existence of plague among wild rodents in 12 States. There is also evidence to indicate that in recent years there has been an increase in the rat population of some urban centers in these States as well as in the cities of the Great Plains region and Mississippi Valley. Should the infection spread from the wild rodents to the urban rats, it is possible that serious outbreaks of human pneumonic plague might occur. Therefore it is apparent that the existence of plague among wild rodents should be a matter of concern to health authorities and physicians in a large part of the United States.

REFERENCES

(*1*) Fox, Carrol, and Sullivan, E. C.: A comparative study of rat-flea data for several seaports of the United States. Pub. Health Rep., **40:** 1909–1934 (1925).
Hasseltine, H. E.: Rat-flea survey of the port of Norfolk, Virginia. Pub. Health Rep., **44:** 579-589 (1929).
Trimble, H. E., and Sherrard, G. C.: Rat and rat-flea survey of Los Angeles harbor. Pub. Health Rep., **50:** 74–79 (1935).
Eskey, C. R.: Flea infestation of domestic rats in San Francisco. Pub. Health Rep., **53:** 948–951 (1938).
(*2*) Eskey, C. R., and Haas, V. H.: Plague in the western part of the United States. Pub. Health Bull. No. 254 (1940).
(*3*) Wheeler, C. M., and Douglas, J. R.: Transmission studies of sylvatic plague. Soc. Exper. and Biol. Med., **47:** 65–66 (1941).
(*4*) Wheeler, C. M., Douglas, J. R., and Evans, F. C.: The role of the burrowing owl and the sticktight flea in the spread of plague. Science, **94:** 560–561 (1941).
(*5*) Creel, R. H.: The migratory habits of rats with special reference to the spread of plague. Pub. Health Rep., **30:** 1679–1685 (1915).

DEATHS DURING WEEK ENDED APRIL 17, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Apr. 17, 1943	Corresponding week, 1942
Data for 87 large cities of the United States:		
Total deaths	9,602	8,669
Average for 3 prior years	8,691	
Total deaths, first 15 weeks of year	147,923	135,235
Deaths under 1 year of age	601	602
Average for 3 prior years	533	
Deaths under 1 year of age, first 15 weeks of year	10,263	8,437
Data from industrial insurance companies:		
Policies in force	66,503,260	64,975,859
Number of death claims	12,628	13,038
Death claims per 1,000 policies in force, annual rate	9.9	10.5
Death claims per 1,000 policies, first 15 weeks of year, annual rate	10.7	10.2

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 24, 1943

Summary

Decreases from the preceding week's totals are shown in the current weekly reports of all of the nine common communicable diseases included in the following tables except poliomyelitis, smallpox, and typhoid fever. Both current and cumulative figures (first 16 weeks) for smallpox and typhoid fever, however, remain below the corresponding 5-year (1938–42) medians.

Meningococcus meningitis cases reported for the week totaled 549, as compared with 605 for the preceding week and a 5-year median of 55. The cumulative figure for the first 16 weeks of the year is 7,601, as compared with a 5-year median of 814 and with 4, 292 for the same period of 1929, the latter being the largest number reported during the comparable period of any of the past 16 years. During the current week, decreases occurred in all but three of the nine geographic sections of the country, both as compared with the preceding week's totals and with the averages for the preceding 3 weeks. In the East North Central group, where the 3-week average was 62, there was an increase during the current week from 68 to 86 cases. In the East South Central group the weekly increase was from 44 to 62, the latter figure being also the 3-week average. In the Mountain States the current week's total was 25, as compared with 18 for the preceding week and also for the average. States reporting the largest numbers for the current week (preceding week's figures in parentheses) were as follows: New York, 76 (69); California, 48 (38); Michigan, 38 (17); Pennsylvania, 29 (43); Massachusetts, 27 (40); Kentucky, 26 (14); Virginia, 24 (27); New Jersey, 23 (23); Illinois, 22 (13); and Maryland, 20 (16).

Currently, 23 cases of smallpox were reported in Ohio, some of which, however, may be delayed reports. For the 13-day period ended April 24, 27 cases were reported in that State, 25 of which occurred in Jefferson County, principally in the Steubenville area. For the current week 6 cases of smallpox were reported in five other States, making a total of 29 cases for the country as a whole.

The total number of deaths recorded for the current week in 90 large cities of the United States was 9,338, as compared with 9,795 for the preceding week and a 3-year (1940–42) average of 8,418. The cumulative total for the first 16 weeks of the year is 160,113, as compared with 146,156 for the same period in 1942.

Telegraphic morbidity reports from State health officers for the week ended April 24, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria: Week ended Apr. 24, 1943	Diphtheria: Week ended Apr. 25, 1942	Diphtheria: Median 1938–42	Influenza: Week ended Apr. 24, 1943	Influenza: Week ended Apr. 25, 1942	Influenza: Median 1938–42	Measles: Week ended Apr. 24, 1943	Measles: Week ended Apr. 25, 1942	Measles: Median 1938–42	Meningitis, meningococcus: Week ended Apr. 24, 1943	Meningitis, meningococcus: Week ended Apr. 25, 1942	Meningitis, meningococcus: Median 1938–42
NEW ENG.												
Maine	2	1	2	-----	-----	1	2	185	185	10	3	0
New Hampshire	0	0	0	1	2	-----	23	8	30	1	0	0
Vermont	0	0	0	-----	-----	-----	347	125	73	1	0	0
Massachusetts	1	2	2	-----	-----	-----	1,524	1,187	746	27	7	1
Rhode Island	2	1	0	1	-----	-----	24	298	49	14	0	0
Connecticut	0	2	1	2	-----	4	447	590	276	11	2	0
MID. ATL.												
New York	18	20	19	[1] 30	[1] 6	[1] 15	3,066	645	1,782	76	13	5
New Jersey	2	5	11	[illegible]	5	5	1,545	663	663	23	5	1
Pennsylvania	11	6	14	1	-----	-----	1,765	1,419	1,419	29	7	7
E. NO. CEN.												
Ohio	9	6	7	20	10	10	1,084	342	342	6	0	2
Indiana	6	5	9	21	7	11	572	171	171	14	0	0
Illinois	19	11	21	9	6	21	1,414	601	601	22	1	1
Michigan [2]	2	6	6	61	1	2	2,878	426	671	38	6	3
Wisconsin	1	1	0	24	60	62	1,620	1,020	1,020	6	1	1
W. NO. CEN.												
Minnesota	0	2	2	1	1	2	285	980	292	3	0	0
Iowa	6	2	3	6	5	8	336	315	228	1	0	0
Missouri	0	4	5	4	-----	5	415	560	386	14	2	1
North Dakota	1	2	1	-----	74	6	[3] 70	71	32	0	0	0
South Dakota	0	5	1	-----	-----	-----	68	13	7	0	0	0
Nebraska	0	3	2	-----	14	5	198	400	154	3	0	0
Kansas	3	2	3	11	3	8	576	720	720	[3] 6	0	0
SO. ATL.												
Delaware	0	0	0	-----	-----	-----	331	4	5	1	0	0
Maryland [2]	1	6	2	3	6	6	107	790	378	20	4	2
Dist. of Col.	1	1	1	3	2	2	78	112	112	2	2	1
Virginia	3	4	9	284	217	224	425	247	457	24	3	2
West Virginia	1	4	3	11	42	42	176	246	246	2	2	2
North Carolina	7	8	14	6	34	8	191	864	864	15	0	2
South Carolina	3	2	4	385	265	416	372	143	143	11	0	1
Georgia	7	6	6	63	47	55	238	201	201	2	2	0
Florida	6	2	2	9	1	7	82	171	232	8	0	0
E. SO. CEN.												
Kentucky	4	2	6	16	6	9	334	67	77	26	2	2
Tennessee	3	3	3	86	16	69	381	121	154	15	1	2
Alabama	0	4	5	114	172	148	288	143	143	15	8	4
Mississippi [2]	7	8	4	-----	-----	-----	-----	-----	-----	6	1	1
W. SO. CEN.												
Arkansas	4	4	5	19	79	95	131	183	183	0	0	0
Louisiana	2	0	5	2	2	9	197	184	70	9	1	1
Oklahoma	6	3	4	43	45	156	43	306	123	1	0	0
Texas	17	30	22	868	554	554	611	1,974	1,140	3	0	1
MOUNTAIN												
Montana	2	1	0	2	4	4	251	158	32	1	0	0
Idaho	10	0	0	3	-----	1	87	134	54	6	0	0
Wyoming	0	1	0	23	141	-----	153	54	54	3	0	0
Colorado	5	7	10	26	39	18	738	310	352	5	1	0
New Mexico	0	7	2	5	1	1	16	99	70	1	0	0
Arizona	0	2	2	68	80	84	64	145	104	4	0	0
Utah [2]	1	0	0	2	11	10	228	441	265	5	0	0
Nevada	0	0	-----	-----	-----	-----	0	273	-----	0	0	-----
PACIFIC												
Washington	3	1	1	2	4	-----	393	377	377	5	3	0
Oregon	2	0	2	17	17	17	346	165	165	6	0	0
California	20	9	16	78	164	69	842	6,074	685	48	2	2
Total	198	201	238	2,339	2,143	2,243	25,362	24,725	24,725	549	79	55
16 weeks	4,340	4,687	5,723	66,304	69,295	134,670	[3] 288,308	279,676	279,676	[3] 7,601	1,231	814

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 24, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42
	Apr. 24, 1943	Apr. 25, 1942		Apr. 24, 1943	Apr. 25, 1942		Apr. 24, 1943	Apr. 25, 1942		Apr. 24, 1943	Apr. 25, 1942	
NEW ENG.												
Maine	0	0	0	8	29	23	0	0	0	0	1	0
New Hampshire	0	0	0	13	10	7	0	0	0	2	0	0
Vermont	0	0	0	12	6	7	0	0	0	0	0	0
Massachusetts	2	0	0	588	391	181	0	0	0	5	0	0
Rhode Island	0	0	0	25	10	17	0	0	0	0	0	0
Connecticut	0	0	0	139	29	94	0	0	0	1	0	1
MID. ATL.												
New York	1	3	0	643	464	531	0	0	0	5	7	2
New Jersey	0	0	0	148	137	156	0	0	0	2	0	3
Pennsylvania	0	0	0	321	540	401	0	0	0	8	8	8
E. NO. CEN.												
Ohio	0	0	1	228	281	258	23	0	0	4	6	3
Indiana	0	2	0	89	102	154	0	1	1	0	2	1
Illinois	0	0	0	166	204	458	0	0	2	1	6	4
Michigan [2]	0	0	0	133	288	326	0	0	6	5	3	2
Wisconsin	0	0	0	380	162	162	0	0	6	0	0	0
W. NO. CEN.												
Minnesota	0	0	0	63	50	80	0	0	3	0	1	0
Iowa	0	0	0	53	35	54	0	0	38	2	0	0
Missouri	1	0	0	116	91	86	0	9	9	2	6	2
North Dakota	0	0	0	3	18	11	0	0	2	0	0	6
South Dakota	0	0	0	14	26	19	0	0	4	1	0	0
Nebraska	0	0	0	36	28	16	0	0	0	0	0	0
Kansas	0	0	1	49	96	96	1	0	1	1	0	1
SO. ATL.												
Delaware	0	0	0	4	45	15	0	0	0	0	0	0
Maryland [2]	0	0	0	74	80	50	0	0	0	2	1	1
Dist. of Col.	0	0	0	20	13	15	0	0	0	0	0	0
Virginia	0	0	0	39	12	31	0	0	0	4	1	1
West Virginia	2	0	0	23	31	31	0	0	0	8	2	2
North Carolina	0	0	0	38	2	20	0	0	0	1	1	1
South Carolina	0	2	2	4	3	4	0	0	0	1	0	0
Georgia	0	1	0	11	10	10	0	1	0	1	10	4
Florida	0	1	1	7	4	5	0	0	0	3	9	4
E. SO. CEN.												
Kentucky	1	1	1	47	71	71	0	0	0	0	0	3
Tennessee	1	0	0	58	50	51	0	1	0	0	4	2
Alabama	0	0	0	13	9	9	0	0	0	0	2	2
Mississippi [2]	1	1	1	9	12	3	0	1	1	4	2	2
W. SO. CEN.												
Arkansas	1	0	0	4	4	5	1	1	1	1	0	5
Louisiana	0	0	0	6	8	8	0	0	0	4	6	6
Oklahoma	1	0	1	19	7	16	0	0	1	2	1	1
Texas	3	4	2	46	36	36	1	3	6	5	6	7
MOUNTAIN												
Montana	0	0	0	6	17	22	0	0	0	0	0	0
Idaho	0	0	0	28	1	4	0	0	0	0	0	0
Wyoming	0	0	0	70	9	7	0	0	0	0	0	0
Colorado	0	0	0	52	22	36	0	0	4	1	0	0
New Mexico	0	0	0	9	5	11	0	0	0	0	1	1
Arizona	3	0	0	10	2	5	0	0	0	0	0	0
Utah [2]	1	0	0	30	16	16	0	0	0	1	0	0
Nevada	0	0	------	0	6	------	0	0	------	0	0	------
PACIFIC												
Washington	0	0	0	35	23	35	1	0	0	0	1	1
Oregon	0	0	0	24	9	11	2	2	8	0	0	0
California	5	1	1	118	102	141	0	0	3	3	3	6
Total	23	16	16	4,031	3,606	4,180	29	19	86	80	90	90
16 weeks	401	343	343	63,798	63,030	76,587	424	362	1,161	882	1,216	1,255

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 24, 1943, and comparison with corresponding week of 1942—Continued

Division and State	Whooping cough: Week ended Apr. 24, 1943	Whooping cough: Week ended Apr. 25, 1942	Whooping cough: Median 1938-42	Week ended Apr. 24, 1943: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENG.												
Maine	25	18	33	0	0	0	0	0	0	0	0	0
New Hampshire	11	6	5	0	0	0	0	0	0	0	0	0
Vermont	11	40	25	0	0	0	0	0	0	0	0	0
Massachusetts	114	206	151	0	0	0	0	0	0	0	0	0
Rhode Island	34	16	10	0	0	0	0	0	0	0	0	0
Connecticut	29	74	57	0	0	0	0	2	0	0	0	0
MID ATL.												
New York	253	441	389	0	4	14	0	0	0	0	0	0
New Jersey	117	299	202	0	0	0	0	0	1	0	0	0
Pennsylvania	231	282	273	0	0	1	0	1	0	0	0	0
E. NO. CEN.												
Ohio	99	148	148	0	0	0	0	1	0	0	0	0
Indiana	93	55	45	0	0	0	0	0	0	0	0	0
Illinois	104	229	136	0	0	0	0	0	0	0	0	0
Michigan [2]	319	215	215	0	1	2	0	0	0	0	0	0
Wisconsin	213	227	154	0	0	0	0	0	0	•0	0	0
W. NO. CEN.												
Minnesota	58	40	40	0	4	1	0	0	0	0	0	0
Iowa	48	37	25	0	0	0	0	0	0	0	0	0
Missouri	26	11	18	0	0	0	0	0	0	0	0	0
North Dakota	6	17	17	0	0	0	0	0	0	0	0	0
South Dakota	4	6	6	0	0	0	0	0	0	1	0	0
Nebraska	6	2	10	0	0	0	0	0	0	0	0	0
Kansas	.97	33	33	0	0	0	0	2	0	0	0	0
SO. ATL.												
Delaware	1	1	10	0	0	0	0	0	0	0	0	0
Maryland [2]	91	63	63	0	0	0	0	0	0	0	0	0
Dist. of Col	17	13	13	0	0	0	0	0	0	0	0	0
Virginia	76	84	84	0	0	0	19	0	0	0	0	0
West Virginia	75	12	38	0	0	0	0	0	0	0	0	0
North Carolina	162	117	216	0	0	0	0	0	0	1	0	2
South Carolina	44	63	63	0	0	0	0	0	0	0	0	1
Georgia	126	13	29	0	2	1	0	0	0	0	3	9
Florida	13	14	19	0	0	2	0	0	0	0	0	3
E. SO. CEN.												
Kentucky	[3] 36	89	80	0	0	0	0	0	0	0	0	0
Tennessee	59	29	33	0	0	0	0	0	0	0	0	0
Alabama	88	35	33	0	0	0	0	0	0	0	0	7
Mississippi [2]				0	0	0	0	0	0	0	3	0
W. SO. CEN.												
Arkansas	28	7	11	0	1	1	0	0	0	0	3	0
Louisiana	5	4	10	0	1	0	0	0	0	0	0	1
Oklahoma	20	12	22	0	0	0	0	0	0	0	0	0
Texas	701	126	229	0	16	140	0	3	0	0	1	16
MOUNTAIN												
Montana	18	20	6	0	0	0	0	0	0	2	1	0
Idaho	3	3	5	0	0	0	0	0	0	1	0	0
Wyoming	13	27	4	0	0	0	0	0	0	2	0	0
Colorado	34	18	46	0	0	4	0	0	0	0	0	0
New Mexico	19	39	21	0	0	0	0	0	0	0	0	0
Arizona	13	21	26	0	1	0	40	0	0	0	0	0
Utah [2]	81	30	73	0	0	0	0	0	0	0	0	0
Nevada	0	4		0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	22	105	105	0	0	0	0	0	0	0	0	0
Oregon	13	44	30	0	0	0	0	0	0	1	0	0
California	319	354	418	0	1	10	0	1	0	0	0	2
Total	3,975	3,749	3,749	0	31	176	59	10	1	8	11	41
16 weeks	[3] 64,183	61,495	65,233	23	472	3,119	729	176	8	17	260	756

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Delayed reports for the week ended April 17 include 1 case of meningococcus meningitis in Kansas, 94 cases of measles in North Dakota, and 42 cases of whooping cough in Kentucky.

WEEKLY REPORTS FROM CITIES

City reports for week ended April 10, 1943

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENG.												
Maine												
Portland	0	0	-----	0	3	7	1	0	3	0	0	17
New Hampshire												
Concord	0	0	-----	0	2	0	0	0	0	0	0	0
Vermont:												
Barre	0	0	-----	0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	0	0	-----	1	198	15	25	0	200	0	0	33
Fall River	0	0	-----	0	78	3	0	0	10	0	0	17
Springfield	0	0	-----	0	5	1	1	0	83	0	0	0
Worcester	0	0	-----	0	366	1	4	0	15	0	0	11
Rhode Island:												
Providence	0	0	1	0	2	9	5	0	12	0	0	39
Connecticut:												
Bridgeport	0	0	-----	0	1	1	2	0	4	0	0	0
Hartford	0	0	-----	0	56	1	9	0	3	0	0	2
New Haven	0	0	-----	0	7	0	2	0	3	0	0	3
MID. ATL.												
New York:												
Buffalo	0	0	-----	1	112	5	11	0	13	0	1	12
New York	19	2	13	5	789	32	98	0	378	0	2	66
Rochester	0	0	-----	0	80	2	4	0	10	0	0	35
Syracuse	0	0	-----	0	105	1	5	0	6	0	1	12
New Jersey:												
Camden	0	0	2	0	20	1	3	0	1	0	0	12
Newark	0	0	10	1	257	6	7	0	12	0	0	16
Trenton	1	0	-----	0	135	0	3	0	14	0	0	0
Pennsylvania:												
Philadelphia	6	0	2	0	404	19	30	0	114	0	0	70
Pittsburgh	2	0	4	2	45	3	13	0	11	0	1	36
Reading	0	0	-----	1	166	0	2	0	6	0	0	6
E. NO. CEN.												
Ohio:												
Cincinnati	0	0	-----	0	148	5	0	0	40	0	0	3
Cleveland	2	1	4	3	19	3	7	0	51	0	0	57
Columbus	0	0	2	2	25	1	5	0	20	0	0	0
Indiana:												
Fort Wayne	0	0	-----	0	2	0	2	0	13	0	0	0
Indianapolis	1	0	-----	1	144	2	11	0	21	0	0	14
South Bend	0	0	-----	0	1	0	3	0	0	0	0	0
Terre Haute	0	0	-----	0	7	0	1	0	0	1	0	0
Illinois:												
Chicago	14	2	2	2	775	4	19	0	83	0	0	50
Springfield	0	0	-----	0	7	0	2	0	2	0	0	0
Michigan:												
Detroit	4	0	1	0	873	11	22	0	42	0	2	114
Flint	0	0	-----	0	22	0	7	0	1	0	0	4
Grand Rapids	0	0	-----	1	5	0	3	0	2	0	0	14
Wisconsin:												
Kenosha	0	0	-----	0	0	0	0	0	6	0	0	1
Milwaukee	0	0	-----	0	388	2	1	0	178	0	0	37
Racine	0	0	-----	0	11	0	0	0	19	0	0	1
Superior	0	0	-----	0	3	0	0	0	1	0	0	2
W. NO. CEN.												
Minnesota:												
Duluth	0	0	-----	0	1	0	0	0	9	0	0	4
Minneapolis	1	0	-----	0	61	1	2	0	30	0	0	20
St. Paul	0	0	-----	0	21	0	5	0	3	0	0	55
Missouri:												
Kansas City	0	0	-----	0	152	4	4	0	43	0	0	6
St. Louis	0	0	3	2	48	16	13	0	24	0	0	19
North Dakota:												
Fargo	0	0	-----	0	5	0	0	0	1	0	0	0
Nebraska:												
Omaha	0	0	-----	1	8	0	3	0	7	0	0	4
Kansas:												
Topeka	0	0	-----	0	266	1	1	0	1	0	0	7
Wichita	0	0	-----	0	137	1	3	0	0	0	0	7

City reports for week ended April 10, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
SO. ATL.												
Delaware												
Wilmington	0	0	----	0	17	1	2	0	2	0	1	0
Maryland:												
Baltimore	1	0	2	1	48	12	17	0	76	0	1	100
Cumberland	0	0	----	0	0	0	0	0	1	0	0	0
Frederick	0	0	----	0	0	0	0	0	0	0	0	0
Dist. of Col.:												
Washington	0	0	---	0	57	7	13	0	26	0	0	26
Virginia												
Lynchburg	0	0	----	0	3	0	1	0	2	0	0	8
Richmond	0	0	---	2	8	2	6	0	5	0	0	1
Roanoke	0	0	---	0	2	0	0	0	0	0	0	0
West Virginia:												
Charleston	0	0	2	0	0	0	0	0	1	0	0	0
Wheeling	0	0		0	1	0	0	0	0	0	0	1
North Carolina:												
Winston-Salem	0	0	1	0	4	0	2	0	0	0	0	15
South Carolina:												
Charleston	0	0	2	0	0	0	1	0	0	0	0	6
Georgia												
Atlanta	0	0	10	0	8	0	2	1	6	0	0	8
Brunswick	0	0		0	3	0	0	0	0	0	0	0
Savannah	0	0	2	1	2	0	4	0	0	0	0	0
Florida												
Tampa	0	0	---	0	3	0	2	0	1	0	0	1
E. SO. CEN.												
Tennessee												
Memphis	0	0	1	0	139	0	4	0	4	0	0	15
Nashville	0	0	---	2	41	0	2	0	1	0	0	5
Alabama												
Birmingham	0	0	7	2	2	0	5	0	1	0	0	1
Mobile	0	0	-	1	0	1	5	1	0	0	0	0
W. SO. CEN.												
Arkansas:												
Little Rock	0	0	----	0	7	0	2	0	1	0	0	0
Louisiana												
New Orleans	2	0	11	2	43	2	7	0	4	0	2	11
Shreveport	0	0	.	0	0	0	4	0	1	0	1	0
Texas:												
Dallas	2	0	1	1	4	1	3	0	1	0	0	15
Galveston	0	0	----	0	5	0	2	0	0	0	0	1
Houston	3	0	----	2	14	0	5	0	3	0	1	11
San Antonio	2	0	1	0	4	0	7	0	0	0	0	0
MOUNTAIN												
Montana.												
Billings	0	0	----	0	1	0	0	0	0	0	0	1
Great Falls	0	0	----	0	21	0	0	0	0	0	0	0
Helena	0	0	----	0	77	0	1	0	3	0	0	0
Missoula	0	0	---	0	6	0	0	0	1	0	0	0
Idaho												
Boise	0	0	-	0	13	0	0	0	0	0	0	0
Colorado												
Denver	8	0	19	1	726	0	3	0	4	0	0	5
Pueblo	0	0	----	0	5	0	0	0	1	0	0	9
Utah												
Salt Lake City	1	0	----	0	111	2	2	0	7	0	0	22
PACIFIC												
Washington.												
Seattle	0	0	----	1	157	0	14	0	3	0	0	8
Spokane	0	0	----	0	126	0	3	0	1	0	0	1
California												
Los Angeles	1	0	16	2	120	5	6	0	33	0	0	35
Sacramento	0	0	1	1	0	2	1	0	2	0	0	5
San Francisco	1	0	1	1	95	3	15	0	24	0	0	32
Total	71	5	121	43	7,836	196	480	2	1,710	1	13	1,150
Corresponding week, 1942	55	2	145	23	5,958	43	421	3	1,342	1	24	1,063
Average, 1938–42	79	--	254	[1] 44	[2] 5,744	---	[1] 466		1,656	14	18	1,095

[1] 3-year average, 1940–42

[2] 5-year median

Dysentery, amebic.—Cases: New York, 4; Los Angeles, 2.
Dysentery, bacillary.—Cases: Bridgeport, 1, Buffalo, 4, New York, 5, Richmond, 1, Los Angeles, 6.
Tularemia.—Cases: Atlanta, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1942, 34,502,400)

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
NEW ENG	0.0	0.0	2.5	2.5	1,784	94.4	122.0	0.0	827	0.0	0.0	303
MID ATL	12.5	0.9	13.8	4.5	942	30.8	78.5	0.0	252	0.0	2.2	118
E. NO CEN	12.3	1.8	5.3	5.3	1,419	16.4	48.5	0.0	280	0.6	1.2	173
W. NO CEN	2.0	0.0	6.0	6.0	1,401	46.1	62.1	0.0	237	0.0	0.0	245
SO ATL	1.7	0.0	33.0	6.9	271	38.2	86.8	1.7	208	0.0	3.5	288
E SO CEN	0.0	0.0	47.5	29.7	1,081	5.9	95.0	5.9	36	0.0	0.0	125
W SO CEN	26.4	0.0	38.1	14.7	226	8.8	88.0	0.0	29	0.0	11.7	111
MOUNTAIN	72.4	0.0	153.0	8.0	7,712	16.1	48.2	0.0	129	0.0	0.0	297
PACIFIC	3.6	0.0	32.7	9.1	934	18.2	70.8	0.0	114	0.0	0.0	149
TOTAL	10.7	0.8	18.3	6.5	1,184	29.6	72.5	0.3	258	0.2	2.0	174

PLAGUE INFECTION IN CALIFORNIA AND WASHINGTON

Plague infection has been reported proved in pools of fleas from rodents collected in California and Washington as follows:

CALIFORNIA

San Diego County: March 15, in a pool of 114 fleas from 27 ground squirrels (*C. fisheri*) taken about 2 miles southwest of Bonsell; March 18, in a pool of 161 fleas from 52 ground squirrels (*C. beecheyi nudipes*) taken on a ranch 1 mile south and 2 miles east of Delmar, Calif.

Monterey County: March 30 and 31, in a pool of 12 fleas from 32 harvest mice (*Reithrodontomys*) taken at Camp Hunter Liggett, Jolon, Calif.

WASHINGTON

Pierce County—Tacoma: March 31, in a pool of 45 fleas from 54 rats (*R. norvegicus*) from frame buildings in an industrial district; April 9, in a pool of 27 fleas from 4 rats from frame buildings in a residential section of Tacoma, Wash.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 27, 1943.—During the week ended March 27, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		15		123	169	28	11	19	56	421
Diphtheria	1	18	1	12	1	8		1		42
Dysentery (bacillary)				16						16
German measles		5		38	34	1		11	11	100
Influenza		16			37	22	2		204	281
Measles		58	2	215	431	84	241	92	139	1,262
Meningitis, meningococcus		4	1	3	6		2	1	3	20
Mumps	2	191		107	1,043	109	119	91	207	1 869
Poliomyelitis						1				1
Scarlet fever		15	10	131	248	31	34	52	20	550
Tuberculosis (all forms)	2	3	5	121	43	24		31	22	251
Typhoid and paratyphoid fever			1	32		1		1		35
Whooping cough		2		65	130	81	8	24	• 52	362

CUBA

Provinces—Notifiable diseases—4 weeks ended February 27, 1943.—During the 4 weeks ended February 27, 1943, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	1	1	5	21		8	36
Chickenpox					1	31	32
Diphtheria	1	31	5	1	1	4	43
Hookworm disease		16					16
Leprosy			1		1	3	5
Malaria	20	7		18	2	219	266
Measles		9		3	1		13
Poliomyelitis	1	1	1	2	6		11
Scarlet fever		1					1
Tuberculosis	22	31	17	53	17	51	191
Typhoid fever	5	65	14	22	10	28	144
Whooping cough	1					1	2

[1] Includes the city of Habana.

GERMANY

Infectious diseases—Year 1942—Comparative.—Cases of certain infectious diseases have been reported in Germany for the year 1942 as compared with the year 1941, as follows: [1]

Disease	1942	1941	Disease	1942	1941
Anthrax	33	52	Psittacosis	6	17
B. welchii infection	106	90	Ptomaine poisoning	1,940	2,255
Cerebrospinal meningitis	2,754	4,766	Scarlet fever	401,011	279,117
Diphtheria	289,863	204,918	Tuberculosis:		
Dysentery, infectious	15,148	10,330	Of the lungs and larynx	126,965	117,558
Inflammation of the brain	426	658	Of the skin	1,837	1,909
Malaria	716	1,613	Of other organs	16,996	15,512
Paratyphoid fever	6,076	4,883	Typhoid fever	16,291	7,723
Poliomyelitis	3,929	3.306	Whooping cough	87,960	107,543

[1] Although not stated in the report, it is assumed that the figures are for the old German Reich.

IRAQ

Cerebrospinal meningitis.—Cerebrospinal meningitis has been reported in Iraq as follows: Week ended February 27, 1943, 17 cases, 3 deaths; week ended March 6, 1943, 32 cases, 3 deaths.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given

CHOLERA

[C indicates cases]

NOTE —Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January-December 1942	January-February 1943	March 1943—week ended—			
				6	13	20	27
ASIA							
Ceylon	C	103	35	1	9		
China:							
Kunming (Yunnanfu)	C	[1] 804					
Shanghai	C	869					
India	C	172,172	52,558				
Calcutta	C	2,331	293		37		
Chittagong	C	55					
Madras	C	84	936	3	7		
Rangoon	C	1					
Vizagapatam	C	13	4				
India (French)	C	14					
Pondichery	C	1					

[1] For the period May 12 to July 4, 1942.

PLAGUE

[C indicates cases, D, deaths; P, present]

Place		January-December 1942	January-February 1943	March 1943—week ended 6	13	20	27
AFRICA							
Basutoland	C	10					
Belgian Congo	C	4					
British East Africa:							
Kenya	C	731	9				
Nairobi	C	69					
Uganda	C	346					
Egypt Port Said	C	3					
Madagascar	C	117	17				
Morocco	C	362	4				
Rhodesia (Northern)	C	16					
Senegal	C	[1] 6					
Union of South Africa	C	104	46				
ASIA							
China.[2]							
India	C	1,286	169	24	24		
Indochina (French)	C	81					
Palestine:							
Haifa	C	5					
Jaffa	C	[3] 7	[3] 7	[3] 1			
EUROPE							
Portugal: Azores Islands	C	1					

[1] Includes 4 suspected cases.
[2] Plague has been reported in China as follows: Chekiang Province, Apr. 1-10, 1942, 4 cases; Fukien Province, Jan. 1-Apr. 5, 1942, plague appeared in 11 localities; Hunan Province, week ended Apr. 18, 1942, 2 cases, Suiyuan Province, pneumonic plague appeared in epidemic form during the period Jan. 1-Apr. 4, 1942, in the northwestern area.
[3] At Jaffa and vicinity.

PLAGUE—Continued

[C indicates cases, D, deaths, P, present]

Place		January-December 1942	January-February 1943	March 1943—week ended— 6	13	20	27
NORTH AMERICA							
Canada Alberta Province—							
Plague-infected fleas		P					
SOUTH AMERICA							
Argentina· Cordoba Province	C	28					
Brazil							
Alagoas State	C	3					
Pernambuco State	C	6					
Chile Valparaiso	C	1					
Ecuador							
Chimborazo Province	D	1					
Loja Province	C	4					
Peru							
Ancash Department	C	8					
Lambayeque Department	C	3	2				
Libertad Department	C	9	6				
Salaverry—Plague-infected rats		P					
Lima Department	C	57	3				
Lima	C	18	1				
Piura Department	C	21					
OCEANIA							
Hawaii Territory							
Hamakua District [4]	D			1			
Plague-infected rats		122	26			15	5
New Caledonia	C	[5] 2					

[4] Plague (human) has also been reported in Hamakua District as follows: Week ended Apr 3, 1 death, week ended Apr 17, 1 death at Honokaa.
[5] Includes 1 case of pneumonic plague.

SMALLPOX

[C indicates cases]

AFRICA							
Algeria	C	814	150		40	38	
Angola	C	268	482				
Basutoland	C	130					
Belgian Congo	C	1,1[illegible]2	303	24	45	42	
British East Africa Tanganyika	C	84		10			
Dahomey	C	56	20				
Egypt	C		8		3		
French Equatorial Africa	C	2					
French Guinea	C	138	6				
Gold Coast	C	1,423	2				
Ivory Coast	C	71	90				
Morocco	C	1,558	266				
Nigeria	C	2,533	959	178	169		
Niger Territory	C	986	23				
Portuguese East Africa	C	51					
Rhodesia.							
Northern	C	9					
Southern	C	1					
Senegal	C	17	14				
Sierra Leone	C	1					
Sudan (French)	C	296	237				
Tunisia	C	1					
Union of South Africa	C	1,462					
Zanzibar	C	[1] 2					
ASIA							
Ceylon	C	7					
China	C	9					
India	C	30,228	2,855	600	843		
Indochina (French)	C	3,729	718				
Iran	C	194	34				
Iraq	C	344	117	7	11	19	2
Palestine	C	10	28				
Syria and Lebanon	C	1,983	418	26			
Trans-Jordan	C	3					

[1] Imported.

SMALLPOX—Continued

[C indicates cases]

Place		January–December 1942	January–February 1943	March 1943—week ended— 6	13	20	27
EUROPE							
France							
Seine Department	C	44					
Unoccupied zone	C	13					
Great Britain:							
England and Wales	C	6					
Scotland	C	99	1				
Ireland (Northern)	C	1					
Irish Free State	C	12					
Portugal	C	56	10		2		
Spain	C	211	63				
Turkey	C	1,841	2,455				
NORTH AMERICA							
Canada	C	5	1				
Guatemala	C	7	2				
Mexico	C	134	8				
Panama Canal Zone	C	[2] 1					
SOUTH AMERICA							
Argentina	C	169					
Brazil	C	3	37				
Colombia	C	615	14				
Ecuador	C	6	9	1			
Peru	C	1,152					
Venezuela (alastrim)	C	159	6				

[2] In the Canal Zone.

TYPHUS FEVER

[C indicates cases]

Place		January–December 1942	January–February 1943	March 1943—week ended— 6	13	20	27
AFRICA							
Algeria	C	35,205	1,112		374	679	
Basutoland	C	36					
Belgian Congo	C		1				
British East Africa: Kenya	C	23	2				
Egypt	C	32,288	5,705	981	1,072		
Gold Coast	C		3				
Ivory Coast	C	4					
Morocco	C	25,846	2,957				
Nigeria	C	5		1			
Niger Territory	C	1					
Rhodesia (Northern)	C	1					
Senegal	C	[1] 3					
Sierra Leone	C	7					
Tunisia	C	16,295					
Union of South Africa	C	1,952	45				
ASIA							
Afghanistan	C	[2] 2,439	520				
China	C	369	6				
India	C	10	12				
Indochina	C	11					
Iran	C	907	111				
Iraq	C	105	83	29	1	2	10
Palestine	C	206	18	8	4		
Syria and Lebanon	C	27	3	1			
Trans-Jordan	C	8					
EUROPE							
Bulgaria	C	709	235				
Czechoslovakia	C	22					
France:							
Seine Department	C	1					
Unoccupied zone	C	229					
Germany	C	[3] 2,043	800				
Great Britain	C	1					
Hungary	C	827	120	8	56	89	47
Irish Free State	C	29					7
Portugal	C	1					
Rumania	C	3,992	1,207	593	497	532	432
Slovakia	C	6	[4] 122				
Spain	C	4,144	83				
Canary Islands	C	1					
Switzerland	C	4					
Turkey	C	427	436				
Union of Soviet Socialist Republics	C	67					

[1] Suspected. [2] Hospitalized cases. [3] In German territory as of 1919. [4] Jan 3 to Mar 13, 1943

TYPHUS FEVER—Continued

[C indicates cases]

Place		January-December 1942	January-February 1943	March 1943—week ended—			
				6	13	20	27
NORTH AMERICA							
Guatemala	C	251	172				
Jamaica	C	53	5	1			
Mexico	C	978	110				
Panama Canal Zone	C	1					
Puerto Rico	C	1					
Salvador	C	1					
SOUTH AMERICA							
Argentina	C	1					
Chile	C	128	15				
Colombia	C	89					
Ecuador	C	171	53	4	10	5	2
Peru	C	923					
Venezuela	C	27					
OCEANIA							
Australia	C	42	17			1	1
Hawaii Territory	C	49	4	1			1

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January-December 1942	January-February 1943	6	13	20	27
AFRICA							
Belgian Congo							
Libenge	D	[1] 2					
Stanleyville	D			1			
British East Africa: Kenya	C	1					
French West Africa	C	1					
Gold Coast	C	[2] 3					
Ivory Coast	C	[2] 7					
Nigeria	C	2					
Senegal [3]	D	1					
Sierra Leone: Freetown	C	2					
Sudan (French)	D	[1] 2					
Togo	C	2					
SOUTH AMERICA							
Bolivia							
Chuquisaca Department	D	1					
La Paz Department	C	7					
Santa Cruz Department	C	18					
Brazil:							
Acre Territory	D	4					
Bahia State	D	1					
Para State	D	1					
Colombia:							
Boyaca Department	D	5					
Cundinamarca Department	D	4					
Intendencia of Meta	D	5	2				
Santander Department	D	4					
Venezuela: Bolivar State	C	2					

[1] Includes 1 suspected case.
[2] Includes 2 suspected cases.
[3] According to information dated Feb. 9, 1942, 15 deaths from yellow fever among Europeans have occurred in Senegal.

×

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

THE PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 58 MAY 7, 1943 NUMBER 19

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol. 58 • MAY 7, 1943 • *No. 19*

ROCKY MOUNTAIN SPOTTED FEVER: SPONTANEOUS INFECTION IN THE TICK *AMBLYOMMA AMERICANUM*[1]

By R. R. PARKER, *Director, Rocky Mountain Laboratory*, GLEN M. KOHLS, *Associate Entomologist*, and EDWARD A. STEINHAUS, *Associate Bacteriologist, United States Public Health Service*

The rickettsia of Rocky Mountain spotted fever has been recovered from a lot of 114 unfed *Amblyomma americanum* nymphs collected September 11, 1942, near Weathers, Okla. This proof of the spontaneous occurrence of the spotted fever rickettsia in this tick, together with accumulated suggestive case data, establishes *A. americanum* as the third species of tick transmitting spotted fever to man in the United States.

The nymphal ticks from which the rickettsia was recovered were collected from vegetation in a wooded pasture close by the home of a child, B. S., just recovered from spotted fever. The woods extended beyond the pasture and partially surrounded the dwelling. Dogs belonging to the family were heavily infested with *A. americanum* nymphs and also carried a few adults of this species and one adult each of *A. maculatum* and *Dermacentor variabilis*. Mrs. S. stated that she often found nymphs (which must have been *A. americanum*) on herself and children, including a baby 2 months of age.

RECOVERY AND IDENTIFICATION OF THE RICKETTSIA

The test nymphs of *A. americanum* were placed on a host guinea pig on September 17 and were removed, partially replete, on the 21st. The host animal was afebrile for 5 days and had temperatures of 40.0°, 40.6°, and 40.6° C. on the sixth, seventh, and eighth days, respectively. Heart blood cultured on the seventh and eighth days was sterile. The guinea pig was sacrificed the eighth day. The spleen was enlarged to twice its normal size; the lungs suggested intercurrent infection; grossly, the testes and adnexa appeared normal. Transfer by a spleen-liver suspension in saline was made intraperitoneally to six fresh animals.

[1] From the Rocky Mountain Laboratory (Hamilton, Mont.), Division of Infectious Diseases, Nationa Institute of Health.

The partially replete nymphs were also triturated in saline and the resultant suspension divided and injected intraperitoneally into four fresh animals.

All guinea pigs in both groups became febrile on the third or fourth day and were sacrificed while febrile for further transfers to provide recovered animals for cross-immunity tests. Heart blood taken from animals before they were sacrificed was bacteriologically sterile. A passage strain was initiated from each group. Only male guinea pigs were used.

Characteristics of the disease in guinea pigs.—The two strain lines have each been carried through 15 passages, the inoculum since the first transfer having been 1 cc. of a spleen-tissue suspension from a guinea pig sacrificed on the third or fourth day of fever. The incubation period has averaged 4 days (shortest 2, longest 8), the febrile period 5 days (shortest 2, longest 8). Two passage guinea pigs have remained afebrile; one was later immune to spotted fever, the other to boutonneuse fever. Therefore, it is evident that inapparent infection may occasionally occur. There have been no fatalities except from intercurrent infections. The strains cross immunize reciprocally.

In animals sacrificed for passage transfer, the spleen has been occasionally of normal size, usually enlarged to less than twice normal size, and in one animal was two and one-half times normal size, the testes and tunicae have usually appeared grossly normal, but were slightly injected in a few animals. The tunicae have not been even slightly adherent to the parietal wall or to the testes, nor has there been any apparent swelling or reddening of the scrotum.

Demonstration of rickettsiae.—Rickettsiae indistinguishable from those of spotted fever have been observed in smears of infected guinea pig tissues stained by the Macchiavello method. They were present in the cytoplasm and occasionally appeared to be intranuclear in cells of the peritoneal lining and tunicae. They were also seen in impression smears of the spleen of a guinea pig sacrificed on the fifth day of fever.

Cross-immunity tests.—We have shown complete reciprocal cross immunity between the disease produced by the *A. americanum* rickettsia and spotted fever (three highly fatal strains, two from western Montana and one from Idaho), boutonneuse fever, South African tick-bite fever, and "maculatum" infection.

Guinea pigs recovered from endemic typhus were all susceptible to the *A. americanum* disease, while of 4 recoveries from the latter disease used in the reverse test, 2 remained afebrile and 2 had 3 and 6 days of fever, respectively, but no scrotal involvement. Of 15 epidemic typhus recoveries that received the *A. americanum* agent, 6 remained afebrile and 9 had fever for 1, 2, 2, 3, 3, 4, 4, 4, and 6 days,

respectively. In the reverse test using 12 animals, 4 remained afebrile and 8 had fever for 2, 3, 3, 3, 3, 4, 5, and 5 days, respectively.

There was no cross immunity in either direction between the *A. americanum* disease and American Q fever.

The complete reciprocal cross immunity between the *A. americanum* disease and spotted fever, boutonneuse fever, South African tick-bite fever, and "maculatum" infection, on the one hand, and the lack of complete reciprocal cross immunity with epidemic and endemic typhus on the other hand, place the *A. americanum* disease in the Rocky Mountain spotted fever group. This finding is further strengthened by the failure of epidemic typhus vaccine to protect against this disease.[2] The fact that spotted fever vaccine affords protection against it definitely identifies this disease as spotted fever, since this vaccine does not protect against other diseases of the spotted fever group (except the fevers of Colombia and of the States of São Paulo and Minas Geraes in Brazil, which are apparently identical with spotted fever).

CASE DATA SUGGESTIVE OF TRANSMISSION OF SPOTTED FEVER BY *AMBLYOMMA AMERICANUM*

In 1933 Parker, Philip, and Jellison (*1*) cited a possible Maryland case of spotted fever in 1926 (*2*), a case in Missouri in 1931 (*3*), and a group of four cases in Louisiana in 1931 for which the available evidence suggested transmission by *A. americanum.*[3] No further suggestive reports were received until 1941 and 1942. One of the 1942 cases has already been referred to in connection with the recovery of a strain of spotted fever from *A. americanum.* The other new evidence includes two especially significant groups of cases occurring in Oklahoma and Texas in 1941 and 1942, respectively, and an apparent case in South Carolina in 1942.

The Oklahoma cases, which were at Armstrong, Bryan County, have been discussed by Hassler, Sizemore, and Robinson (*4*) in a paper presented before the American Epidemiological Society, Baltimore, Md., on March 20, 1942. They included seven persons, the entire Q. family (grandmother, father, mother, and three children), and the attending physician. All were bitten by ticks on the Q. premises, including the physician, who found a tick attached to his body after

[2] This vaccine also failed to protect against a strain of spotted fever isolated from a Texas case occurring in 1942 (see below) which was presumably infected by *Amblyomma americanum.* See footnote 5.

[3] The four Louisiana patients, all ill during the same period, were a husband and wife, 66 and 53 years of age, respectively, and two grandsons each about 5 years old. The two children lived in separate houses within three-fourths mile of their grandparents. The three families intermingled freely. The grandparents and one of the children died within the 5-day period August 20 to 24, the second child recovered. The area was heavily wooded and heavily infested with ticks. Local collections made by the Federal Bureau of Entomology, including one tick from the bedroom of the grandparents, were all *A. americanum.* These cases were investigated by Medical Director L. L. Lumsden and Surgeon T. B. H. Anderson, of the U. S. Public Health Service, and by other physicians who concurred with the attending physician in the diagnosis. We are indebted to Dr. Lumsden for very kindly sending us the available records of these cases.

spending a night at the Q. home. The onsets all occurred during the 32-day period from August 13 to September 13. Three of the cases were fatal.

The premises were visited by F. R. Hassler and R. A. Robinson in early September 1941, and nymphal ticks were collected from the family dog and cat and from grass and sand around the house. Nine of these were forwarded to the Rocky Mountain Laboratory and were identified by R. A. Cooley as nymphs of *A. americanum.* Three were engorged and were tested for infectious agents with negative results.

Later in the same month, four pocket gophers (probably *Geomys breviceps dutcheri*) infested with *A. americanum* were trapped on the premises and apparent strains of Rocky Mountain spotted fever were established in guinea pigs from the tissues of one of the gophers and from the nymphs attached to it.[4]

Unfortunately, these strains were lost before cross-immunity tests could be made with a known strain of spotted fever. However, the strain data given by Hassler et al. strongly suggest that the infectious agent involved was that of spotted fever.

The locality was visited in early September of 1942. No ticks were found on the premises at that time. It was learned that the dwelling in which the Q. family resided was one of several new houses recently built at the edge of town on acreage previously used as pasture land. The Q. family took possession in the early summer of 1941 but immediately left for Texas, whence they returned about two weeks before the onset of the first case. The house and a converted trailer, in which one member of the family lived, were both located under three large live oak trees. These were the only trees in the pasture land fenced off for the new houses, and the localized *A. americanum* population on the Q. premises was probably owing to the former use of the shade by tick-infested cows. Neither the occupants of the other houses in 1941, nor the family occupying the Q. dwelling in 1942 were troubled by ticks.

None of the observations made in 1941 or again in 1942 indicated the local occurrence of *D. variabilis.*

The four Texas cases in 1942 occurred in two children in each of two families (B. and D.) living in a trailer camp on the edge of West Columbia. Onsets were within the 5-day period, June 15 to 19. The B. children, 4 and 5 years of age, both recovered; the D. children, 10 months and 3 years of age, both died. There were 12 children in the camp at this time, and numerous adult and nymphal ticks had been removed from all of them.

Clinical and epidemiological data for these cases and the histopathological changes in the two fatal ones have been discussed in

[4] This is thought to be the first record of pocket gophers as hosts of *A. americanum.*

papers by Reading and Klint (*5*) and by Anigstein and Bader (*6*) presented before the meetings of the American Society of Tropical Medicine, Richmond, Va., November 10 to 12, 1942, and in one by Anigstein and Bader (*7*) published in Science (1942). Epidemiological studies, including the collecting of ticks for testing for infectious agents, were made in late June and early July by Anigstein and Bader and independently by T. McGregor, of the Texas State Board of Health Laboratory (Austin), and in late August by one of us (G. M. K.) and McGregor.

The trailer camp, like the premises on which the Oklahoma cases became infected in 1941, had but recently been part of a cattle pasture and also contained large live oak trees under which cattle could seek shade. Adult ticks were abundant in late May. In late June nymphs were present, and McGregor collected several adults in the corners of the camp ground. At that time, and again in late August dogs and cows belonging to all nearby neighbors were examined; some nymphs and adults were collected on both occasions. On the latter occasion no ticks were found at the camp, but 5,500 nymphs were collected by dragging a small heavily wooded section adjoining the pasture land.

No species of ticks other than *A. americanum* was collected by any of these persons. Anigstein and Bader recovered a nymph of this species from the mother and another from the brother of the D. cases.

Anigstein and Bader (*6*) report that strains of infection were established in guinea pigs from blood samples from the D. cases and that these strains cross immunize with each other and with a strain of Rocky Mountain spotted fever sent them from the Rocky Mountain Laboratory.[5] One of the D. strains, kindly furnished by Anigstein, exhibits complete reciprocal cross immunity with our *A. americanum* strain of spotted fever.

A pool of seven adult *A. americanum* collected in late June from a cow and dogs in the vicinity of the camp was injected into guinea pigs by Anigstein and Bader (*6*). They believed that possible spotted fever infection resulted in one of the test animals, but unfortunately the strain was not maintained and the few animals available for immunity testing did not remain completely afebrile when tested against one of the D. strains.

The entire 5,500 *A. americanum* nymphs collected in late August were tested at the Rocky Mountain Laboratory for infectious agents.

---

[5] In July 1942, guinea pigs of the 145th passage of the Mastenbrook strain of spotted fever, established in 1940 from a western Idaho case, were shipped to Dr. Anigstein. This strain was used for the cross-immunity tests with the two strains established from the D. family. It is of interest to note that Anigstein and Bader report that this strain has, in their hands, at Galveston, Tex., killed only 15 percent of passage animals, whereas at Hamilton, Mont., guinea pigs of the 145th to 174th passage of this strain have shown a fatality rate of 90 percent.

Febrile periods occurred in numerous test animals, but quite unfortunately an intercurrent *Salmonella* infection made it necessary to destroy all the guinea pigs before they could be challenged with spotted fever virus.

The South Carolina case was that of an entomologist (O'K.) who spent the period April 11 to 17, 1942, on Bull Island, a few miles off Charleston, and then returned to New Hampshire. He became ill on April 20. The clinical findings suggested spotted fever. The patient has written us that ticks had been active on the island for about a month previous to his arrival and were "unbelievably" abundant during his stay. "A considerable number of ticks were found" attached to his body each of several nights. Unfortunately, none were saved for determination, but the patient was informed by F. C. Bishopp, of the Federal Bureau of Entomology and Plant Quarantine, that *A. americanum* was the prevailing local species. The probability that the attached ticks were of this species is enhanced by the fact that he found "a considerable portion of the ticks difficult to remove" and the mouthparts were left in the skin.

DISCUSSION

Since the studies of Parker et al. reported in 1933 (*1*), which included not only the suggestive case data referred to above but also data showing that *A. americanum* is an efficient vector of spotted fever under laboratory conditions, it has been felt that the evidence that would go furthest to convict *Amblyomma americanum* as a carrier of spotted fever both in nature and to man would be the demonstration of the spontaneous occurrence of the specific rickettsia in this tick. It was further felt that it would be particularly significant if this virus could be recovered from ticks that had not ingested blood (i. e., collected from vegetation rather than from a host), since this would show beyond question that it had persisted from an earlier stage or generation. In the hope of accomplishing this, some 5,000 specimens of *A. americanum* (larvae, nymphs, and adults) collected in Texas, Oklahoma, Arkansas, and Missouri have since been tested (through 1941), without obtaining convincing evidence. Many of the several hundred test guinea pigs exhibited fever, a few showed scrotal swelling and reddening, and a few were later immune when challenged with spotted fever virus. However, no infection that could definitely be identified as spotted fever was established, but several strains of American Q fever were isolated from ticks collected in Liberty County, Tex., in 1937.

Aside from the evidence suggestive of *A. americanum* as the transmitting agent, the data for the seven Oklahoma cases in 1941 are of especial interest for two reasons: (1) they afford the first record in the United States of so large a number of cases of spotted fever in a single

household in the same year, and (2) if the infectious agent from pocket gophers established by Hassler et al. (*4*) in guinea pigs was that of spotted fever (Hassler's data and our subsequent demonstration of the spontaneous occurrence of the spotted fever rickettsia in *A. americanum* strongly suggest that it was), then this is the first record of the recovery of the rickettsia of spotted fever from our native fauna.

With respect to the first point, multiple cases of spotted fever in single households during the same tick season are of more frequent occurrence in the United States than it is generally supposed. In most instances such multiple infections have been limited to two cases, but there are several records of three cases and one record of four cases. However, the occurrence of seven cases on the same premises within a 32-day period is sufficiently startling to indicate some unusual epidemiological element that is not present when *Dermacentor andersoni* or *D. variabilis* is the transmitting agent. The evidence at hand suggests that this element consists in two factors, first that *A. americanum* nymphs bite man freely whereas those of the dermacentors do not and, second, that under favorable conditions these nymphs may occur in immense concentrations within relatively small areas. Another contributing factor may be an apparent tendency in the South to ignore the bites of immature ticks.

As previously pointed out, the epidemiological setting of the four Texas cases in 1942 was quite similar to that of the Oklahoma cases, except that the former group occurred in two families. However, these two families lived in trailers parked close together under the same tree.

While it is felt that the accumulation of circumstantial case data together with the proof that ticks are infected in nature is adequate for the conclusion that *A. americanum* is a vector of spotted fever, nevertheless there are not sufficient data on which to evaluate its importance as such.

The wide host relationship of this tick, which includes rodents and other animals known or presumed to be susceptible to spotted fever, the fact that larvae, nymphs, and adults all bite man (larvae and nymphs of *Dermacentor andersoni* and *D. variabilis* rarely bite man), and its occurrence on dogs and cats which often bring it into more or less intimate contact with persons in the home are points which, collectively, carry the implication that it could well be a transmitting agent of considerable importance within areas in which it is abundant. A detracting factor may be that a presumably large percentage of the immature ticks engorge on horses and cattle, which are supposedly not susceptible to spotted fever, whereas the larvae and nymphs of the two dermacentors engorge almost exclusively on susceptible small mammals.

Hooker, Bishopp, and Wood (1912) (*8*) show *A. americanum* as occurring east and south of a line starting from a short distance west of the southernmost tip of Texas and extending northward and northeastward across the States of Oklahoma, Kansas (southeastern corner), Missouri, Illinois, and Indiana into southern Michigan, and thence almost directly eastward across New York and the southern portions of the three northern New England States. However, such evidence as we have suggests that it is extremely scarce in the northern portion of this area.[6] We also have recent reports of its occurrence in southern Iowa. Actually, there is very little published information concerning the distribution and abundance of this tick in any of the 18 States concerned. Apparently it is most abundant in parts of Texas, Louisiana, Oklahoma, Arkansas, and Missouri. Doubtless it is abundant, at least sporadically, in other southern States eastward to the Atlantic Coast.

The data of Hooker, Bishopp, and Wood (*8*) and observations by Kohls and other members of the staff of the Rocky Mountain Laboratory indicate that *A. americanum* is active from some time in the spring until some time in the fall, the seasonal limits apparently varying somewhat with the latitude. The adults are most prevalent during the spring and early summer, the nymphs and larvae thereafter. Therefore, the season of the year during which cases of Rocky Mountain spotted fever transmitted by this tick are likely to occur is essentially concurrent with that of cases caused by *D. variabilis*. However, the fact that larval and nymphal *A. americanum*, which bite man so freely, are abundant in the late summer and early fall when adult *D. variabilis* are decreasing in numbers suggests that in areas where both occur, the former could well be a more important late-season transmitting agent than the latter. However, there is no present evidence indicating that this is necessarily so. It is likely that the true importance of *A. americanum* as a spotted fever vector may prove difficult to determine. This problem is accentuated, first, because its range lies entirely within that of *D. variabilis* and, second, because individual ticks which cause human infections are seldom recovered and those recovered are rarely identified by competent persons. Another complicating factor is the question of differential diagnosis in sections where both endemic typhus and spotted fever are prevalent. Certain epidemiological considerations may prove helpful, e. g., whether the patient was bitten by a larva, nymph, or adult tick (if adult, either species is possible; if immature, *A. americanum* is strongly indicated), apparent presence of only one

[6] The State Entomologists of Ohio, Indiana, and Illinois (J. S. Houser, J. J. Davis, and W. P. Flint' respectively), and R. E. Rebrassier, of the College of Veterinary Medicine of Ohio State University, have recently informed us that they know of no records of *A. americanum* in their respective States.

species in the locality where infection occurred (at West Columbia, Tex., only *A. americanum* was found), and the character of the local vegetative setting (*A. americanum* is much more abundant in wooded areas than *D. variabilis*).

SUMMARY

The rickettsia of Rocky Mountain spotted fever has been recovered from *Amblyomma americanum* nymphs collected from vegetation. Old and recent case data suggestive of the transmission of spotted fever by this tick are discussed. The evidence of spontaneous infection in *A. americanum*, together with the suggestive case data, is considered sufficient to establish this tick as the third species transmitting spotted fever to man in the United States.

ACKNOWLEDGMENTS

The writers are indebted to F. R. Hassler, of the Oklahoma State Department of Health, L. Anigstein and M. N. Bader, and B. Reading and H. A. Klint, all of the University of Texas Medical School, Galveston, for kindly sending us copies of their respective manuscripts prior to publication; to L. Anigstein and Wendell Gingrich (also of the University of Texas Medical School) and F. R. Hassler and Rita A. Robinson, of the Oklahoma State Department of Health, and Paul Sizemore, County Health Officer of Bryan County, Okla., for assistance rendered during field studies in 1942; to S. W. Bohls and T. McGregor, of the Texas State Board of Health Laboratory at Austin, for assistance on various field trips during the period 1937 to 1942; and to Stanley J. Carpenter, of the Arkansas State Board of Health, for specimens of *Amblyomma americanum* collected and sent to us in 1939.

REFERENCES

(*1*) Parker, R. R., Philip, Cornelius B., and Jellison, Wm. L.: Rocky Mountain spotted fever: potentialities of tick transmission in relation to geographical occurrence in the United States. Am. J. Trop. Med., **13**: 341–378 (1933).

(*2*) Spencer, R. R.: A case of typhus-like fever following tick bite. Pub. Health Rep., **41**: 2523–2524 (1926).

(*3*) Toomey, Noxon: Typhus-like (spotted) fever from tick bite. Ann. Int. Med., **5**: 1296–1307 (1932).

(*4*) Hassler, F. R., Sizemore, Paul, and Robinson, Rita Alice: Manuscript.

(*5*) Reading, Boyd, and Klint, Hugo A.: Clinical observations on spotted fever in the Gulf Coast of Texas. Manuscript.

(*6*) Anigstein, Ludwik, and Bader, Madero N.: Investigations on rickettsial diseases in Texas. Part I. Epidemiological role of ticks common to the Gulf Coast in relation to local spotted fever. Part II. Experimental and epidemiological studies of an outbreak of spotted fever in the Gulf Coast. To be published by the University of Texas, Medical Branch.

(*7*) Anigstein, Ludwik, and Bader, Madero N.: New epidemiological aspect of spotted fever in the Gulf Coast of Texas. Science, **96**: 357–358 (1942).

(*8*) Hooker, W. A., Bishopp, F. C., and Wood, H. P.: The life history and bionomics of some North American ticks. U. S. Department of Agriculture, Bureau of Entomology, Bulletin No. 106 (1912).

MORBIDITY AND MORTALITY FROM SPECIFIC CAUSES DURING 1942 AND RECENT PRECEDING YEARS

Morbidity

The following data concerning the prevalence of nine communicable diseases are based on weekly telegraphic reports from the health officers of all of the States and the District of Columbia. Although cases of each of these diseases are reportable by law, there is considerable variability in the completeness of the reports. While the number of cases reported is smaller than the number which actually occur during any given year, it is believed that the data indicate reasonably accurate trends and times of unusual prevalence of a disease.

DISEASES ABOVE MEDIAN PREVALENCE

Meningococcus meningitis.—The number of cases (3,769) of meningococcus meningitis reported during 1942 was 1.9 times the number reported in 1941, which figure (2,001) also represents the median incidence for the 5-year period 1937–41. For the country as a whole this disease was relatively high throughout 1942, with a rather sharp rise in the number of cases during the last weeks of the year which has continued into 1943. Each section of the country contributed to the high incidence except the East South Central and Mountain, the excesses ranging from about 1.2 times the median in the two North Central regions to almost 5 times the median in the New England region.

Measles.—The only other communicable disease more prevalent than usual during 1942 was measles. Although the number of reported cases (approximately 500,000) exceeded the median for 1937–41 by about 30 percent, it was about 40 percent less than the number reported in 1941. This disease reached the highest peak on record in 1941, with every section showing a large excess over the median except the New England, Mountain, and Pacific regions. In 1942 these three regions had excesses over the 5-year median and the South Atlantic, West North Central, and West South Central were again above the median.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—The incidence of diphtheria reached a new low level during 1942. The total number of reported cases (15,450) was about 10 percent below even the low incidence of the preceding year, and about 35 percent less than the median for 1937–41. The situation was favorable in all sections of the country, but the New England and Pacific regions reported slightly more cases in 1942 than in 1941. The three southern sections had more cases than any other three sections.

TABLE 1.—*Number of reported cases of 9 communicable diseases in the United States during the year 1942, the number for the year 1941, and the median number of cases reported for the years 1937–41*

Division	1942	1941	5-year median 1937–41	1942	1941	5-year median 1937–41	1942	1941	5-year median 1937–41
	Diphtheria			Influenza [1]			Measles [2]		
United States	15,450	16,937	24,180	109,229	630,670	291,000	506,252	868,771	384,853
New England	297	251	398	232	12,004	1,167	50,645	36,809	39,353
Middle Atlantic	1,502	1,678	2,985	916	7,658	2,431	72,576	288,337	115,198
East North Central	2,052	2,367	3,991	3,677	22,099	20,983	53,712	270,894	53,941
West North Central	1,057	1,163	1,495	1,466	21,038	10,870	47,908	51,597	31,597
South Atlantic	4,133	4,690	6,768	34,373	218,016	65,481	58,820	125,491	46,081
East South Central	1,823	2,056	2,713	9,494	77,825	28,084	8,667	40,133	10,822
West South Central	2,948	2,980	3,391	43,378	213,374	62,210	51,499	32,899	18,288
Mountain	686	903	989	10,715	31,600	23,649	35,583	20,528	20,528
Pacific	952	849	1,362	4,978	27,056	27,056	126,842	22,023	24,287
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	3,769	2,001	2,001	4,193	9,082	9,082	126,395	127,482	161,975
New England	477	162	102	185	420	151	14,425	10,017	10,017
Middle Atlantic	1,068	443	499	700	2,255	1,185	30,389	33,985	43,653
East North Central	292	228	236	979	1,372	1,445	35,970	39,177	59,168
West North Central	158	108	132	502	470	901	13,464	11,647	17,905
South Atlantic	748	439	439	377	1,929	893	11,623	10,638	10,660
East South Central	253	287	287	440	1,812	380	6,698	8,439	6,626
West South Central	291	175	180	478	299	346	3,285	3,525	4,680
Mountain	94	43	101	166	143	344	4,120	3,639	5,107
Pacific	388	116	116	366	382	780	6,421	6,415	10,604
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	826	1,373	9,479	6,731	8,543	12,743	178,119	208,987	208,084
New England	1	0	0	276	264	286	21,280	16,143	16,378
Middle Atlantic	34	0	0	852	1,231	1,232	47,825	40,502	44,265
East North Central	206	455	2,103	798	993	1,683	45,688	49,184	44,016
West North Central	157	496	2,745	371	467	737	7,383	14,599	11,864
South Atlantic	37	37	51	1,587	1,917	2,656	17,904	29,141	27,043
East South Central	101	79	234	906	1,200	1,570	6,586	7,700	6,839
West South Central	223	125	372	1,350	1,685	3,052	9,051	13,759	12,777
Mountain	40	80	802	337	378	529	6,842	12,470	8,859
Pacific	27	101	919	254	408	653	15,560	25,489	20,081

[1] Mississippi New York, and Pennsylvania excluded, New York City included.
[2] Mississippi excluded.

Influenza.—The number of reported cases of influenza in 1942 was less than 20 percent of the number for 1941 and less than 30 percent of the 1937–41 median. The largest numbers of cases were reported in the South Atlantic, West South Central, and Mountain regions, but the disease did not reach epidemic proportions in any section of the country and the total number of cases for the country as a whole was the lowest in recent years.

Poliomyelitis.—This disease also reached a comparatively low level during 1942, the total number of cases being less than 50 percent of the median for 1937–41. The numbers of reported cases in the two South Central regions and New England were above the 5-year medians, but there was no unusual occurrence in any part of the country. With the exception of 1938 when only 1,720 cases were

reported, the incidence in 1942 was the lowest since 1932 when the cases totaled approximately 3,800.

Scarlet fever.—This disease also reached a new low level in 1942. The number of cases (126,395) was, however, only slightly below that for 1941, but it was less than 80 percent of the median expectancy (approximately 162,000 cases). New England reported a considerable excess and the South Atlantic a smaller excess over the expectancy, but the incidence in all other regions either closely approximated or fell considerably below the 5-year median.

Smallpox.—The incidence (826 cases) of smallpox during 1942 was the lowest on record. From 1933 to 1938 a peak of approximately 14,000 cases was gradually attained, but since 1938 there has been a rapid decline until the low level of 1942 was reached. The 34 cases reported from the Middle Atlantic region were spread by a person from Ohio with an active case of smallpox who attended a wedding in the neighborhood of Lancaster, Pa. Vaccinations were widespread and numerous and there was no further spread of the disease. Other regions where the disease is normally high reported a low incidence.

Typhoid and paratyphoid fever.—The typhoid fever situation was very favorable in 1942. The number of cases (6,731) was less than 80 percent of the number recorded for 1941 and less than 55 percent of the median for 1937–41. For the country as a whole as well as for all regions except New England the incidence in 1942 was the lowest on record.

Whooping cough.—The number of cases (178,119) of whooping cough reported in 1942 was about 15 percent less than the normal expectancy (approximately 208,000 cases). Excesses over the 5-year medians were reported from the New England, Middle Atlantic, and East North Central regions, but in all other sections the numbers of cases were lower than the 5-year median.

Mortality

The annual mortality rates for specific causes for the past 5 years as shown in table 2 are based on preliminary data for 35 States and the District of Columbia. Similar mortality rates by quarters for the past 3 years are shown in table 3. Death rates for specific causes for each of the 35 States, the District of Columbia, and Hawaii are presented in tables 4 and 5.

This report is made possible through a cooperative arrangement with the respective States which voluntarily furnish provisional tabulations of current birth and death records to the United States Public Health Service. Because of lack of uniformity in the method of classifying deaths according to cause, and the impossibility of including a certain number of delayed certificates, these data are

preliminary and will differ in some instances from the final figures subsequently published by the Bureau of the Census. Data for preceding years from the same source, collected and tabulated in the same way as the current data, are included for comparative purposes. These provisional rates are used in preference to the final figures published by the Bureau of the Census because it is believed that they are more comparable with current provisional information.

TABLE 2.—*Summary of mortality trends from certain causes in a group of 35 States,*[1] *1938–42 (estimated civilian population May 1, 1942, 95,494,428)*

[Rates provisional for all years]

Diseases (numbers in parentheses are from the International List of Causes of Death, 1938 revision)	1942	1941	1940	1939	1938
	Rate per 1,000 population				
Deaths, all causes	10 5	10 5	10 6	10 5	10 5
Births, exclusive of stillbirths	19 5	18 6	17 6	17 0	17 5
	Rate per 1,000 live births				
Infant mortality (live births, 1942, 1,863,878)	44	45	46	47	50
Maternal mortality	2 7	3 0	3 6	3 8	4 2
	Rate per 100,000 population				
Typhoid and paratyphoid fever (1-2)	0 52	0 79	1.00	1 50	1 75
Dysentery (27)	1 39	? 08	2.04	1 82	2.14
Diarrhea and enteritis under 2 years (119)	6 95	. 93	7 41	8 17	10 54
Appendicitis (121)	6 45	8 27	9 87	10 91	11 24
Scarlet fever (8)	34	.35	51	66	97
Diphtheria (10)	86	91	1 00	1 52	1 89
Whooping cough (9)	1 87	2 57	2 07	2.20	3 38
Measles (35)	.84	1 51	.50	.80	2.27
Cerebrospinal (meningococcus) meningitis (6)	68	50	.48	.48	.75
Acute poliomyelitis and acute polioencephalitis (36)	39	.56	.69	47	.34
Acute infectious encephalitis (lethargic) (37)	.42	70	.52	44	.56
Malaria (28)	43	58	68	83	1 19
Pellagra (69)	1 01	1 21	1 29	1 56	2.10
Tuberculosis, all forms (13-22)	43 0	44 3	44 9	46 0	47 9
Syphilis (30)	11.6	13 2	14.0	14 6	15 4
Influenza (grippe) (33)	8.2	15 8	14 7	16 2	12 1
Pneumonia, all forms (107-109)	46 6	47 4	54 0	59 3	66 7
Cancer, all forms (45-55)	124 3	121 1	118 9	115 4	113 9
Diabetes mellitus (61)	26 2	25 9	26 7	25 6	24.0
Intracranial lesions of vascular origin (83)	92.0	87.6	89 7	85 8	83 9
Diseases of the heart (90-95)	303 4	295 3	293.7	279 4	270 3
Nephritis, all forms (130-132)	72.6	74 2	77 6	73 2	75 8
All accidents, including automobile accidents (169-195)	68 8	73 9	70 1	68 7	70 1
Automobile accidents (170a, b, c)	20 1	28 4	24 6	22 9	23 4

[1] Includes all of the States listed in table 5. The District of Columbia is counted as a State

TABLE 3.—*Mortality from certain causes in each quarter of 1942, 1941, and 1940, in the 35 States*[1] *with available data*

[Rates provisional for all years]

Period	All causes, rate per 1,000 population (annual basis)	Births (exclusive of stillbirths) per 1,000 population (annual basis)	Rate per 1,000 live births: Total infant mortality	Rate per 1,000 live births: Maternal mortality	Death rate per 100,000 population (annual basis): Typhoid and paratyphoid fever (1-2)	Dysentery (27)	Diarrhea and enteritis under 2 years (119)	Scarlet fever (8)	Diphtheria (10)	Whooping cough (9)	Measles (35)	Cerebrospinal (meningococcus) meningitis (6)	Acute poliomyelitis and polioencephalitis (36)	Acute infectious encephalitis (lethargic) (37)	Tuberculosis, all forms (13-22)	Syphilis (30)	Influenza (grippe) (33)	Pneumonia, all forms (107-109)	Cancer, all forms (45-55)	Diabetes mellitus (61)	Intracranial lesions of vascular origin (83)	Diseases of the heart (90-95)	Nephritis, all forms (130-132)	All accidents, including automobile accidents (169-195)	Automobile accidents (170a, b, c)
January-December:																									
1942	10.5	19 5	44	2.7	0 5	1.4	6.9	0 3	0 9	1.9	0 8	0 7	0.4	0 4	43 0	11 6	8 2	47	124	26 2	92	303	73	69	20.
1941	10.5	18.6	45	3.0	.8	2.1	7.9	.4	.9	2.6	1 5	5	.6	7	44 3	13 2	15 8	47	121	25 9	88	295	74	74	28.
1940	10.6	17 6	46	3.6	1 0	2.0	7 4	.5	1 0	2 1	.5	.5	.7	5	44 9	14 1	14 7	54	119	26.7	90	294	78	70	24.
January-March:																									
1942	11.3	17 8	50	2.9	.4	8	3.5	.5	1 0	2.0	1 6	7	.2	4	45 1	12 3	15 7	69	124	29.2	99	332	80	68	22.
1941	12.0	17 4	53	3.3	.5	([2])	3 6	.5	.9	2 9	1 6	6	.3	5	48 1	([2])	45 6	82	121	31.1	98	346	85	68	23
1940	12.1	16.4	53	4.1	5	([2])	3.7	.9	1 4	1.9	.8	7	.3	5	47 7	([2])	34 5	88	120	31 7	102	340	88	67	20
April-June:																									
1942	10.3	17.7	44	2.7	.5	1 2	5 9	3	3	1 9	1 3	8	.2	.4	46 1	11 6	6 6	41	123	25 6	88	292	71	67	18.
1941	10 3	17.8	45	3.0	.6	([2])	5 9	4	.5	3 0	3 5	5	3	.5	47 8	([2])	8 5	40	121	25.9	87	292	75	70	24
1940	10.4	17.0	47	3.9	7	[2]	7 6	5	.6	2 1	9	5	.2	6	48 1	([2])	10 4	47	118	25 5	88	292	79	65	21
July-September:																									
1942	9.6	20.2	41	2.8	.7	2.2	10 9	.2	5	1 7	3	.4	7	4	39 9	10 6	2 4	27	123	22 7	81	262	64	69	19
1941	9.6	20.2	40	3.0	1.3	([2])	13 6	2	7	2.6	.7	4	1 1	1 3	41 0	([2])	2.7	26	120	22.1	78	253	65	80	30
1940	9.6	18 7	41	3.4	1 9	([2])	11 4	2	6	2 1	.2	.3	1.4	6	42.5	([2])	3 2	28	119	23 2	81	253	69	75	25
October-December:																									
1942	11.0	22.1	41	2.4	5	1 4	7 4	3	1 7	1 8	2	.8	.5	.5	41.1	12 0	8.2	51	127	27 3	99	328	75	71	19.
1941	10 2	19 0	44	2.7	.8	([2])	8 5	3	1 7	1.8	4	.5	6	.5	40 2	([2])	7 0	43	122	24 6	88	291	72	77	34
1940	10.4	18.1	46	2.9	.9	([2])	7 0	4	1 4	2 2	1	.4	9	4	41 4	([2])	10 7	53	119	26.5	88	291	75	74	31.
Industrial policy holders:[3]																									
1942	7.4	-----	-----	-----	4	-----	[4] 4 4	.4	6	1 0	5	-----	-----	-----	41 7	10 5	4 2	29	106	28 0	61	[5] 158	[6] 50	50	16.
1941	7.4	-----	-----	-----	5	-----	[4] 5 0	.4	.7	1 3	8	-----	-----	-----	42.6	11 5	7 8	31	105	27 4	61	[5] 156	[6] 52	50	20.
1940	7.6	-----	-----	-----	.7	-----	[4] 4 6	6	8	1.2	3	-----	-----	-----	44 6	12 0	7 9	36	104	29 8	61	[5] 160	[6] 57	47	18

[1] States included are those listed in table 5. The District of Columbia is counted as a State.
[2] Data not available.
[3] These data are taken from the January 1943 Monthly Statistical Bulletin published by the Metropolitan Life Insurance Co. The figures are subject to correction, since they are based on provisional estimates of lives exposed to risk (17,700,000 persons in 1938). Data do not include all diseases reported to the Public Health Service.
[4] Classified as diarrhea and enteritis, age not specified.
[5] Excludes pericarditis, acute endocarditis, acute myocarditis, coronary artery diseases, and angina pectoris.
[6] Chronic nephritis (Bright's disease) only.

TABLE 4.—*Trend of death rates from all causes, of birth rates, and of infant and maternal mortality rates, 1938–42*

[Rates provisional for all years]

State	Deaths, all causes (rate per 1,000 population)					Births, exclusive of stillbirths (rate per 1,000 population)					Infant mortality (rate per 1,000 live births)					Maternal mortality (rate per 1,000 live births)				
	1942	1941	1940	1939	1938	1942	1941	1940	1939	1938	1942	1941	1940	1939	1938	1942	1941	1940	1939	1938
Colorado	11.4	10.8	11.1	11.2	11.4	20.7	19.2	18.9	18.3	18.3	51	51	60	53	59	1.8	3.3	4.4	5.1	4.3
Connecticut	9.2	9.1	9.5	10.0	10.3	17.1	13.5	11.8	12.5	13.8	30	32	38	38	36	2.1	2.4	3.5	2.9	2.7
Delaware	11.7	11.8	12.1	11.8	12.0	19.4	18.1	16.5	16.3	16.7	47	43	51	44	51	1.7	2.2	5.0	4.7	5.7
District of Columbia	11.0	11.7	13.0	12.7	12.6	26.0	24.4	22.8	21.5	20.6	44	50	47	47	48	2.2	2.2	2.8	4.7	5.4
Florida	11.4	12.0	11.9	11.4	11.6	20.6	19.0	17.2	17.0	16.9	47	54	54	57	58	4.2	6.4	6.3	6.4	7.3
Georgia	9.4	9.9	10.0	9.7	10.5	23.6	21.2	20.2	19.9	20.2	49	59	58	59	68	4.1	4.4	5.2	5.5	6.6
Idaho	9.5	8.9	9.3	9.2	9.0	24.1	23.9	22.4	21.9	22.3	35	34	41	45	45	2.7	2.3	3.2	2.5	3.7
Illinois	11.1	10.7	11.2	11.0	10.8	19.3	16.9	15.6	15.0	15.5	33	34	35	38	41	1.9	2.5	2.9	3.0	3.3
Indiana	11.4	10.9	11.3	11.1	10.9	21.4	17.5	16.9	15.6	16.2	37	38	39	41	45	2.7	2.8	2.7	3.9	3.8
Iowa	10.1	9.6	9.8	9.9	9.6	19.6	16.8	17.9	17.0	17.1	34	38	34	39	38	2.1	2.6	3.1	2.6	3.1
Kansas	10.7	10.5	10.2	10.3	10.2	19.4	17.5	15.9	16.0	16.3	35	37	38	39	43	2.4	2.4	3.6	3.4	4.0
Kentucky	9.8	10.5	10.3	10.4	9.8	22.8	21.8	21.7	20.8	24.6	49	58	46	54	49	2.8	4.0	3.8	4.4	3.8
Louisiana	9.6	10.0	10.9	10.4	10.6	23.6	22.6	21.0	20.5	20.6	49	58	65	61	66	3.1	4.1	5.3	6.0	6.0
Maine	12.6	12.7	12.4	12.8	12.3	21.1	18.6	17.5	17.6	18.2	43	51	54	51	49	2.0	2.6	4.2	4.2	4.2
Maryland	11.7	11.8	12.1	11.5	11.7	21.3	18.8	16.7	15.7	16.4	46	55	49	50	55	1.9	2.2	2.7	3.3	3.4
Massachusetts	12.0	11.9	11.8	11.6	11.2	([1])	16.3	15.3	14.5	13.8	([1])	35	38	37	40	([1])	2.9	2.8	3.5	3.9
Michigan	9.5	9.8	9.9	10.1	10.0	22.1	19.8	18.8	18.3	19.1	37	39	41	42	45	2.1	2.7	2.9	2.9	3.5
Montana	10.4	10.4	10.2	10.6	10.2	22.0	21.2	20.4	19.4	19.2	35	37	46	50	43	2.1	1.7	3.5	3.2	3.7
Nebraska	9.8	9.5	9.5	9.1	9.0	18.9	17.1	16.5	16.5	16.5	33	34	36	34	36	1.7	2.3	3.2	3.4	3.4
Nevada	13.3	11.7	11.9	11.3	11.7	21.7	17.2	18.6	17.3	17.2	59	41	50	44	45	.8	2.9	4.9	4.2	1.6
New Mexico	9.9	10.6	10.5	10.9	11.0	27.2	27.6	29.8	30.0	29.0	91	97	93	96	99	4.1	3.9	4.4	4.3	4.6
New York	11.6	11.2	11.1	11.1	11.0	19.0	16.0	14.6	14.1	14.2	32	33	37	39	40	2.2	2.3	2.9	3.0	3.8
North Carolina	8.6	9.1	9.0	9.0	9.7	26.1	24.3	23.0	22.7	23.0	48	59	56	58	68	3.4	4.1	5.3	4.8	5.6
North Dakota	7.7	8.3	7.9	8.4	7.9	22.0	21.7	20.9	20.8	20.2	37	39	41	48	48	2.5	1.8	1.6	2.3	2.2
Ohio	11.1	11.2	11.3	11.2	10.9	20.4	17.6	16.3	15.6	16.4	38	41	39	42	42	2.0	2.5	3.3	3.6	3.7
Oklahoma	9.5	8.9	8.7	8.9	8.5	21.7	20.0	19.0	18.8	19.2	40	49	50	52	43	3.5	3.0	3.5	4.2	4.0
Pennsylvania	11.1	10.8	10.9	10.7	10.8	20.9	18.1	16.3	16.3	16.8	36	39	44	44	46	1.9	2.2	2.5	3.2	3.5
Rhode Is and	11.3	11.0	11.2	11.0	11.8	19.5	16.1	15.1	14.7	15.0	40	36	38	40	44	1.9	2.1	2.4	3.2	2.5
South Dakota	9.3	9.2	8.7	8.9	7.4	21.0	19.7	19.0	18.0	18.0	38	41	39	41	45	2.3	2.2	3.7	3.0	3.5
Tennessee	9.2	9.8	10.0	9.7	10.0	21.5	19.8	18.2	17.6	17.9	48	56	55	54	64	3.3	3.8	4.8	5.5	5.6
Texas	8.9	9.2	9.3	8.7	9.6	([1])	21.2	19.7	19.1	19.3	([1])	57	69	67	65	([1])	3.6	4.6	4.9	5.6
Utah	8.9	8.2	8.9	8.5	8.8	28.9	24.6	24.4	23.1	24.3	33	30	40	37	45	1.8	1.7	2.4	2.8	3.2
Vermont	11.3	11.7	11.6	11.7	11.6	19.1	18.4	18.4	15.9	15.7	43	44	46	46	48	1.8	2.2	3.8	3.3	3.0
Virginia	10.3	11.1	11.0	10.7	10.9	22.6	21.1	20.1	19.4	19.8	55	68	60	62	69	3.2	4.0	4.4	4.9	5.1
Wyoming	9.2	9.1	8.5	8.9	9.0	23.4	21.2	19.9	19.7	19.5	46	45	47	45	53	2.4	2.3	4.4	3.5	3.5
Hawaii	7.6	7.4	7.3	7.5	7.9	23.8	23.5	22.6	21.7	22.1	39	40	44	54	59	2.8	2.5	2.2	3.5	3.8

[1] Data not available.

520063°

TABLE 5.—*Trend of death rates for various causes per 100,000 population, 1938–42*

[Rates provisional for all years]

State	Typhoid and paratyphoid fever (1-2)					Dysentery (27)					Diarrhea and enteritis under 2 years (119)					Appendicitis (121)				
	1942	1941	1940	1939	1938	1942	1941	1940	1939	1938	1942	1941	1940	1939	1938	1942	1941	1940	1939	1938
Colorado	0.7	0.8	0.6	1.9	2.1	1.2	1.1	1.2	1.8	1.3	13.4	11.7	14.8	12.1	13.8	7.3	12.7	14.7	15.3	18.3
Connecticut	.1	.3	.3	.4	.4	(1)	.2	.1	1.1	.1	2.5	2.1	1.9	2.1	3.4	4.5	7.3	8.7	9.2	9.2
Delaware	.4	(1)	.7	2.6	1.5	.4	.8	.8	.4	1.2	14.9	10.3	4.9	5.3	12.2	3.3	8.6	10.1	12.2	11.7
District of Columbia	.4	.7	.7	.8	1.0	.4	1.2	1.5	.5	1.4	20.9	22.0	10.2	11.5	11.4	7.3	9.6	11.8	12.5	14.1
Florida	1.4	1.5	1.3	1.5	2.5	1.9	2.0	1.6	2.4	2.5	8.0	9.3	7.6	10.5	12.1	6.4	8.9	10.3	10.8	11.9
Georgia	.8	1.7	2.0	2.6	3.9	2.8	3.4	3.9	4.3	6.4	9.3	13.8	12.5	13.0	22.0	5.7	7.6	9.0	9.4	9.5
Idaho	1.0	1.0	1.1	3.1	2.9	(1)	.6	1.5	.6	.4	.6	1.6	6.5	5.8	4.9	4.8	12.4	16.0	16.7	14.5
Illinois	.2	.1	.4	1.4	.8	.7	.5	.7	.9	1.0	2.0	3.3	2.5	3.1	5.5	6.7	9.0	10.7	11.6	12.0
Indiana	.3	.6	.8	1.1	.7	.6	1.0	.8	.9	1.2	7.2	6.2	3.5	5.5	8.6	7.8	8.1	10.7	10.8	12.0
Iowa	(1)	.2	.4	.6	.8	.2	.4	.4	1.0	1.0	2.3	1.8	2.1	2.3	3.4	7.2	8.4	10.1	12.8	12.2
Kansas	.4	.3	.6	.7	.7	.5	.3	.6	1.3	1.2	3.8	2.8	3.8	4.0	5.1	8.1	10.7	11.7	14.0	12.0
Kentucky	1.6	2.8	2.5	4.3	4.9	4.8	8.9	4.1	6.8	7.5	13.0	20.9	13.7	19.0	30.4	6.4	9.1	10.4	10.8	11.6
Louisiana	1.8	2.5	3.7	5.8	5.0	1.9	2.4	3.0	2.8	3.9	8.0	9.6	14.9	12.4	16.3	6.3	8.5	9.7	12.5	13.1
Maine	.5	.4	.6	1.1	1.9	.2	.2	.1	.1	.7	7.8	6.2	5.3	5.6	7.8	8.0	9.9	12.7	11.6	11.1
Maryland	.5	.9	.6	.9	1.8	1.2	2.4	1.0	2.1	3.6	13.1	17.1	6.7	9.4	11.3	4.5	5.8	6.4	8.0	6.4
Massachusetts	.0	.1	.2	.3	.3	.0	.2	.1	.3	.5	2.7	4.0	3.0	2.0	2.7	5.0	7.3	9.8	9.9	10.6
Michigan	.1	.2	.2	.6	.6	.6	.8	.3	.5	1.0	4.3	4.9	3.3	5.2	6.2	5.7	8.5	9.8	11.1	10.7
Montana	(1)	.4	.7	2.2	.9	.6	1.1	1.6	1.3	1.5	3.6	5.0	7.0	5.2	5.8	7.3	11.1	14.7	15.8	13.6
Nebraska	.2	.4	.4	.4	.5	.2	.2	.5	.5	.6	2.3	1.3	2.4	2.2	2.4	6.2	8.1	12.6	12.3	10.8
Nevada	1.6	2.5	.9	.9	2.8	6.2	1.8	.9	(1)	2.8	13.3	4.2	3.6	3.7	4.7	12.5	16.3	13.6	7.4	18.0
New Mexico	1.2	1.9	3.0	3.2	4.1	10.0	19.7	14.1	11.3	14.2	36.3	48.3	41.7	38.0	43.3	6.7	10.7	12.2	11.5	13.0
New York	.2	.2	.3	.3	.5	.3	.5	.2	.3	.4	3.2	2.8	3.0	4.3	4.6	6.3	8.0	9.6	10.6	11.2
North Carolina	.6	.9	1.1	1.3	2.0	1.6	2.4	1.7	2.3	3.2	13.4	20.3	13.1	19.0	29.5	5.6	6.6	6.3	7.8	8.2
North Dakota	.2	.2	.6	.6	.3	.5	.2	.8	.3	1.2	6.1	3.6	5.8	7.0	7.6	7.4	7.5	11.1	13.1	12.0
Ohio	.3	.5	.7	.7	.8	.3	.5	.2	.6	.7	6.6	7.7	4.4	5.1	6.8	6.0	8.6	9.9	11.4	11.5
Oklahoma	1.6	1.6	2.5	3.9	4.1	3.7	2.7	3.4	4.1	2.5	5.8	4.8	10.4	9.4	10.3	8.4	10.7	12.0	14.7	11.7
Pennsylvania	.4	.5	.6	.6	.9	.2	.4	.2	.3	.3	3.7	4.6	3.8	4.5	5.4	5.9	7.1	8.9	9.8	10.4
Rhode Island	.1	.1	1.0	.1	.4	(1)	(1)	.1	(1)	.1	9.7	3.1	2.0	4.0	5.1	4.4	6.3	12.9	12.7	11.1
South Dakota	.9	.3	(1)	1.2	1.2	(1)	.5	.2	.8	.3	3.2	2.8	5.1	5.4	5.7	7.7	9.3	10.6	11.5	11.7
Tennessee	.7	1.5	2.1	3.3	3.7	2.4	4.1	5.7	4.8	8.9	9.4	12.9	10.6	12.8	22.1	6.5	7.4	8.6	9.8	10.7
Texas	1.2	2.1	3.1	4.5	6.2	(2)	5.3	10.1	6.5	5.7	17.7	15.8	29.1	25.7	28.6	(2)	8.6	9.8	11.8	12.3
Utah	.5	.7	.5	.4	.4	.4	.4	.5	.9	.4	3.3	2.5	3.6	2.2	5.3	9.2	10.0	12.4	16.6	18.6
Vermont	.3	.9	.8	.3	.3	.6	.5	.8	1.4	(1)	3.5	4.5	4.7	3.6	2.8	13.1	9.5	13.9	15.1	11.5
Virginia	1.0	1.1	1.0	1.8	2.1	3.4	5.4	2.9	3.9	5.1	11.3	17.1	8.8	11.1	16.2	5.4	5.6	7.3	7.5	7.2
Wyoming	(1)	1.2	.8	2.8	2.0	.4	.0	1.6	.8	.4	3.4	2.9	6.0	6.0	8.9	12.9	10.0	14.0	19.4	18.8
Hawaii	1.6	1.2	2.4	1.9	2.4	.5	(2)	.2	.2	.5	6.4	8.1	5.7	11.1	12.4	4.6	(2)	8.0	7.0	7.8

[1] No deaths reported [2] Data not available

State	Scarlet fever (8)					Diphtheria (10)					Whooping cough (9)					Measles (35)				
	1942	1941	1940	1939	1938	1942	1941	1940	1939	1938	1942	1941	1940	1939	1938	1942	1941	1940	1939	1938
Colorado	1.0	0.6	0.5	1.0	1.1	2.1	2.1	1.2	2.9	3.3	2.5	5.5	2.9	4.6	4.2	1.5	1.4	1.3	1.3	2.7
Connecticut	(1)	.1	(1)	.2	2	(1)	(1)	2	.4	.7	3	5	.2	1.3	7	.2	1	.2	.5	1
Delaware	1.5	7	1.1	.4	8	(1)	.4	(1)	.8	.8	4.4	2.2	2.2	3.0	5.4	(1)	2.2	(1)	(1)	.8
District of Columbia	2	(1)	.3	2	.5	4	.3	4	.8	1.1	2.1	1.3	1.6	2.3	1.0	(1)	.5	(1)	.3	3
Florida	.2	.1	.1	.3	2	1.5	1.1	1.4	1.9	1.9	2.4	1.9	1.7	3.1	3.6	2.8	.9	.3	7	1.5
Georgia	1	.5	.5	.5	4	1.8	1.7	1.8	2.9	3.3	3.3	4.4	3.3	4.0	7.3	2.0	4.9	.7	1.6	4.8
Idaho	2	4	1.3	4	1.0	.8	2	.2	.8	6	.8	3.8	1.3	1.9	2.7	.6	2	9	.8	.8
Illinois	4	5	8	9	1.7	.8	.7	1.1	1.5	1.5	1.2	1.1	8	2.0	2.2	.5	1.1	.2	0	2.6
Indiana	4	7	1.2	1.4	2.0	.5	.7	1.0	1.6	2.4	1.9	1.4	2.2	1.8	1.3	.3	1.6	1	.2	3.1
Iowa	3	3	7	9	1.8	.4	.3	5	.6	1.0	1.3	1.5	9	1.7	2.6	.6	.6	5	1.1	1.0
Kansas	3	3	5	7	1.4	3	.5	7	.4	1.0	1.0	3.2	1.8	.4	2.8	1.2	1.9	9	.2	1.3
Kentucky	8	9	1.0	1.1	1.5	2.0	1.9	1.8	3.2	4.0	4.1	8.1	6.1	2.4	6.6	9	5.5	6	1.1	3.8
Louisiana	1	2	(1)	2	3	1.9	1.7	2.1	2.9	3.2	2.7	1.8	6.4	4.8	3.9	1.2	1	5	4.1	.9
Maine	7	1	.7	4	(1)	4	4	7	2.1	2.0	3.0	2.3	2.5	3.6	3.0	1.5	1.3	1.1	.6	2.1
Maryland	2	.2	.4	3	5	3	4	4	1.1	1.0	1.2	4.2	3.5	1.1	2.9	7	7	1	.9	.4
Massachusetts	2	.3	.3	3	6	2	.3	.2	3	.4	7	1.0	5	1.0	8	.4	1	.3	4	.3
Michigan	.4	6	8	1.3	1.7	4	.4	4	5	9	1.2	1.6	1.2	1.5	2.3	1	1.2	3	6	2.0
Montana	6	1.5	1.6	1.6	1.8	1.0	2.6	1.1	1.6	1.6	2.3	1.1	9	2.9	8.6	(1)	2	9	2.9	2.0
Nebraska	3	.3	.9	1.0	1.1	6	3	.8	1.0	1.2	1.0	2.4	8	1.0	2.6	6	.3	5	1.0	.8
Nevada	1.6	(1)	(1)	(1)	(1)	(1)	(1)	.9	(1)	2.8	6.2	3.4	2.7	(1)	2.8	1.6	(1)	(1)	1.8	(1)
New Mexico	2	.4	.6	4	1.0	2.7	1.7	1.3	2.9	3.3	6.9	10.1	9.5	7.1	12.3	6.0	9.5	.9	8	10.0
New York	2	.2	3	4	5	1	1	1	2	3	1.1	8	1.0	1.0	1.3	.1	.4	.1	.4	.7
North Carolina	3	.3	3	4	6	2.0	2.5	3.3	4.9	5.1	2.9	5.7	2.5	6.4	7.6	1.6	2.8	3	1.8	7.0
North Dakota	.5	.3	8	1.1	2.8	7	1.0	1.4	2.0	9	2.0	2.4	2.2	2.0	9.7	3.4	.3	.3	3.4	2.9
Ohio	.5	.4	6	1.1	1.2	4	4	4	9	1.3	1.8	2.6	1.8	1.2	1.8	4	1.6	.0	.1	2.6
Oklahoma	.1	2	3	.7	.9	2.3	3.0	3.2	3.3	5.2	2.3	5.2	2.4	1.0	7.9	4.6	1.0	.2	3.2	2.4
Pennsylvania	4	3	5	6	1.2	.2	2	4	7	1.0	1.5	1.5	1.3	1.5	1.7	4	1.0	1	.1	2.4
Rhode Island	4	.3	(1)	(1)	4	8	1	3	1	.1	1.2	6	3	2.0	1.1	6	1	.4	4	(1)
South Dakota	2	.2	6	1.2	1.1	3.6	2.0	8	3.2	1.5	4.9	4.4	6	9	7.8	(1)	1.0	.5	4.3	8
Tennessee	4	.5	5	6	.7	1.4	1.7	1.6	3.0	3.7	2.4	5.3	3.9	3.3	7.1	1.2	4.4	.6	1.5	6.9
Texas	2	.1	.2	3	5	2.3	2.5	2.3	2.6	3.8	2.6	3.4	3.7	3.3	5.9	1.6	1.2	3.1	1.3	1.8
Utah	.7	(1)	1.1	4	9	5	2	(1)	9	1.1	7	1.6	1.8	1.1	2.8	2.3	(1)	9	.4	2.0
Vermont	.3	6	3	1.1	3	.3	(1)	(1)	8	3.6	3.8	(1)	1.7	6.7	3.1	9	.6	(1)	1.7	3.3
Virginia	4	3	4	3	3	1.5	1.6	2.0	3.7	4.4	3.6	6.9	4.7	5.8	7.1	6	6.1	8	.8	3.4
Wyoming	1.7	8	4	4	2.4	4	2.5	1.6	1.2	2.8	2.6	1.7	4	4	13.4	1.3	8	2.4	4	(1)
Hawaii	2	(1)	(1)	(1)	.2	2	5	1.4	1.0	5	3.0	1.6	1.9	7.2	5.4	2	1.2	(1)	(1)	.2

[1] No deaths reported.

TABLE 5.—*Trend of death rates for various causes per 100,000 population, 1938–42*—Continued

State	Cerebrospinal (meningococcus) meningitis (6)					Acute poliomyelitis and polioencephalitis (36)					Acute infectious encephalitis (lethargic) (37)					Malaria (28)				
	1942	1941	1940	1939	1938	1942	1941	1940	1939	1938	1942	1941	1940	1939	1938	1942	1941	1940	1939	1938
Colorado	1.6	0.5	0.4	0.7	0.5	0.5	0.5	1.2	1.1	0.6	0.6	2.1	0.7	0.5	1.5	------	------	------	------	------
Connecticut	.7	.1	.4	.2	.2	.1	.1	.1	.1	(1)	.2	.1	.2	.1	.1	------	------	------	------	------
Delaware	(1)	(1)	.7	1.5	.4	(1)	.7	.7	.4	.4	1.5	.7	(1)	1.1	(1)	------	------	------	------	------
District of Columbia	1.6	.5	.7	.6	1.4	.1	1.2	.4	.2	.5	.2	.1	.7	.2	.5	------	.1	.1	.2	------
Florida	.7	.8	.4	.5	.8	.2	1.8	.4	.3	.6	.1	.4	.3	.4	.5	2.6	4.4	5.2	6.1	8.9
Georgia	.6	.5	.3	.5	.6	.3	1.0	.2	.5	.6	.2	.2	.1	.1	.3	2.5	2.4	2.8	3.1	4.9
Idaho	.4	.6	.9	1.7	1.8	(1)	.2	.6	1.5	.2	.4	1.0	.9	1.5	1.2	------	------	.2	.2	------
Illinois	.3	.2	.2	.2	.3	.4	.3	.7	.3	.2	.3	.3	.3	.2	.4	.2	.1	.2	.4	.4
Indiana	.1	.5	.3	.4	.7	.7	.4	2.1	.1	.3	.4	.1	.6	.5	.7	------	------	.3	.2	.3
Iowa	.1	.5	.6	.4	.6	.1	.2	2.2	1.1	.4	.2	.7	.8	.7	1.0	------	------	------	------	.1
Kansas	.2	.5	.6	.4	.3	1.2	.5	2.2	.3	(1)	1.0	1.6	.8	1.6	1.2	------	.2	.3	.1	.2
Kentucky	1.0	1.1	1.2	1.2	2.2	.9	1.2	1.4	1.2	1.0	.4	.1	.5	.8	.3	.4	.6	.6	1.1	1.1
Louisiana	.7	.8	.6	.6	.9	.4	.3	.8	.4	.4	.2	.1	.2	.3	.4	1.8	3.0	3.7	5.0	7.9
Maine	3.0	1.2	1.1	.4	.1	.4	.6	.2	.7	.5	.7	.4	.4	.6	.1	.1	------	.1	------	------
Maryland	2.4	1.1	.3	.6	.7	(1)	.3	.3	.1	.1	.4	.8	.4	.4	.9	.1	------	------	------	.2
Massachusetts	.8	.6	.3	.4	.6	.0	.2	.1	.1	.2	.3	.3	.2	.2	.2	.1	.0	------	.0	.0
Michigan	.4	.2	.2	.3	.4	.2	.3	1.3	.8	.2	.3	.3	.3	.1	.2	.1	.1	------	.0	------
Montana	1.3	.7	1.2	.9	1.8	(1)	1.9	1.4	(1)	.4	1.5	2.6	1.8	1.4	5.4	------	------	------	------	------
Nebraska	.2	.5	.3	.2	.4	2.2	.9	1.6	.6	.5	.2	1.3	.5	.4	.8	------	------	------	------	------
Nevada	2.3	(1)	.9	.9	(1)	.8	(1)	.9	(1)	(1)	1.6	.8	(1)	(1)	(1)	------	------	------	------	------
New Mexico	.6	.2	.6	1.0	.8	1.3	.4	.6	1.5	.8	1.0	.4	(1)	.4	(1)	------	1.5	.7	.8	.2
New York	.9	.7	.4	.5	.8	.2	.4	.1	.4	.2	.9	.8	.9	.4	.7	.0	.0	.1	.2	.3
North Carolina	.5	.5	.3	.5	.9	.3	.4	.3	.3	.3	.1	.3	.3	.2	.4	1.1	.9	1.8	1.7	2.2
North Dakota	.2	.2	.3	.5	1.4	.3	.2	.6	.3	(1)	1.9	21.5	2.0	1.7	4.2	------	------	------	------	------
Ohio	.2	.2	.4	.2	.7	.3	.7	.8	.2	.2	.2	.7	.5	.6	.4	.1	.1	.0	.1	.1
Oklahoma	.5	.4	.9	.5	1.0	.7	.6	1.2	.4	1.0	.5	.4	.6	.6	.3	1.1	2.3	1.0	2.2	3.5
Pennsylvania	.7	.3	.6	.6	.7	.2	.6	.3	.5	.2	.2	.7	.6	.6	.7	.0	------	------	------	------
Rhode Island	1.0	.3	.3	.6	.9	.1	.4	.3	(1)	.1	.7	.6	.3	(1)	.6	------	------	------	------	------
South Dakota	1.5	.3	.6	.8	.3	.2	.3	.8	.6	.3	.3	.9	.2	.5	1.1	------	------	------	------	------
Tennessee	.6	1.2	.6	.7	1.7	.9	1.5	.3	.5	.7	.6	.5	.6	.7	.5	1.2	1.8	2.2	3.4	3.6
Texas	.5	.4	.5	.3	.6	.7	.8	.6	1.1	.7	.2	.3	.4	.3	(1)	1.4	2.1	2.4	2.2	4.0
Utah	.2	.4	.5	.9	1.3	(1)	.2	1.1	1.3	(1)	.5	.9	.4	.9	.2	------	------	------	------	------
Vermont	.3	.9	1.4	.6	(1)	1.2	.3	.3	1.4	1.1	.3	(1)	.3	.3	.3	------	------	------	------	------
Virginia	2.0	1.5	1.2	.9	1.6	.3	.4	1.0	.3	.3	.5	.1	.7	.3	.2	.2	.1	.2	.3	.1
Wyoming	.9	1.7	2.8	.8	.8	.9	(1)	2.8	1.2	1.2	(1)	2.9	1.6	(1)	.8	------	.4	------	------	------
Hawaii	.9	(1)	.5	.5	.5	(1)	1.4	1.2	1.4	.5	(1)	.5	(1)	.2	.5	------	------	------	------	------

State	Pellagra (69) 1942	1941	1940	1939	1938	Tuberculosis, all forms (13-22) 1942	1941	1940	1939	1938	Syphilis (30) 1942	1941	1940	1939	1938	Influenza (grippe) (33) 1942	1941	1940	1939	1938
Colorado	0.2	0.1	0.1	0.1	0.1	52.3	48.3	52.9	55.5	57.6	9.7	13.0	12.0	14.6	15.6	9.8	18.5	13.7	22.8	13.4
Connecticut	2	2	.2	1	.1	32.4	31.4	32.4	34.3	36.8	5.8	9.1	9.1	10.9	11.8	2.3	4.8	4.4	4.7	4.5
Delaware	---	4	---	---	.4	49.4	54.2	46.8	57.1	50.1	14.9	18.8	21.8	17.1	22.6	9.1	11.8	10.5	12.9	10.7
District of Columbia	2	---	1	.2	6	59.7	60.0	64.0	66.1	71.7	19.4	21.7	24.5	27.4	34.7	2.9	4.4	6.9	9.2	5.2
Florida	2.6	3.3	3.8	4.0	5.7	44.1	46.9	50.0	49.4	54.5	18.6	26.8	26.7	28.1	31.1	14.5	27.4	28.8	27.7	20.7
Georgia	5.9	6.3	7.3	8.5	11.6	41.4	42.3	47.2	46.4	50.4	15.1	16.3	20.6	20.2	20.4	15.8	32.3	28.7	29.1	24.9
Idaho	---	---	6	4	---	14.9	16.8	17.8	18.7	19.4	5.0	5.5	8.0	9.5	6.9	9.0	12.8	17.8	17.5	16.3
Illinois	1	2	2	3	2	40.8	43.7	46.2	45.8	47.0	10.5	12.8	13.4	12.8	14.3	4.7	6.4	8.1	12.3	5.6
Indiana	1	---	1	1	.1	36.7	30.3	37.6	41.4	39.4	10.0	13.6	14.4	14.0	14.9	16.0	19.8	21.9	26.0	12.7
Iowa	1	.1	.1	1	---	16.3	13.9	16.0	17.4	18.3	6.8	8.7	7.0	8.0	8.0	9.1	13.6	15.9	23.7	12.6
Kansas	6	.5	.4	3	.3	25.6	23.1	24.7	23.5	23.6	11.3	12.2	11.8	12.8	13.5	13.3	23.6	18.4	18.9	15.8
Kentucky	1.6	1.4	1.9	2.8	2.2	63.8	68.2	68.4	70.3	69.7	9.7	10.3	11.2	11.9	13.0	14.9	36.6	28.2	33.8	25.5
Louisiana	2.3	2.6	2.7	3.5	6.3	50.6	55.0	58.8	58.8	61.7	22.1	24.0	21.2	27.3	27.6	12.7	26.0	32.7	23.1	23.2
Maine	6	2	---	.5	2	31.4	29.9	29.5	35.1	30.2	6.8	7.1	9.0	8.7	7.3	10.7	18.4	12.6	20.2	15.3
Maryland	.1	---	2	.4	3	72.0	73.5	78.6	72.1	74.4	18.4	20.4	21.5	26.9	26.2	5.5	9.7	8.4	9.7	7.4
Massachusetts	.2	.2	1	.2	.2	38.6	38.7	37.4	37.1	38.1	5.8	7.4	8.6	9.4	9.3	2.4	6.7	3.4	5.4	3.6
Michigan	.1	.1	.2	0	.1	32.9	32.0	33.3	36.5	37.0	10.1	10.6	11.5	13.1	13.8	4.0	8.1	5.1	14.5	6.3
Montana	---	2	---	2	---	37.4	37.2	40.2	42.7	42.5	10.7	10.9	11.8	13.2	13.9	5.9	16.8	13.7	23.3	19.1
Nebraska	3	.1	.1	---	.1	14.0	15.8	17.0	16.5	16.4	6.2	7.1	7.8	6.8	9.0	11.6	23.7	19.9	17.1	11.3
Nevada	---	---	.9	9	---	57.0	45.3	67.7	52.4	58.1	14.0	30.8	19.0	13.0	26.5	5.5	5.9	11.7	6.4	9
New Mexico	8	2.1	3.6	2.9	3.5	60.9	66.7	70.7	72.6	76.7	10.2	11.3	14.7	17.2	17.9	13.1	15.2	13.7	19.9	10.7
New York	1	.1	1	2	.2	45.4	47.0	46.2	47.9	48.8	14.6	15.1	15.7	16.3	16.5	2.2	4.1	3.1	4.1	3.5
North Carolina	3.8	4.0	4.7	5.8	7.3	45.7	50.3	49.7	51.0	53.6	8.6	10.6	12.3	12.4	13.8	8.6	25.7	21.1	17.9	14.2
North Dakota	---	---	2	---	---	19.7	19.1	20.0	21.9	21.6	2.2	5.6	4.2	5.6	5.0	4.4	11.3	9.2	17.5	11.7
Ohio	1	2	1	1	---	40.8	42.3	39.9	42.6	45.1	11.6	13.3	14.5	15.7	16.1	9.2	14.4	14.7	18.7	11.1
Oklahoma	1.2	2.2	2.2	4.2	4.5	47.2	46.7	47.6	45.7	48.9	7.5	10.1	12.1	11.8	13.8	12.6	24.7	24.4	21.9	17.2
Pennsylvania	1	1	1	1	1	39.3	38.6	39.5	40.2	42.2	11.3	13.0	13.4	14.6	15.3	6.4	11.1	10.8	12.3	10.1
Rhode Island	1	1	.1	.3	.1	37.0	37.5	33.0	37.5	39.6	10.3	9.3	9.3	11.0	14.3	2.6	5.3	4.3	5.1	4.7
South Dakota	---	2	2	---	---	28.6	30.1	34.3	29.2	36.4	5.8	6.4	5.6	6.2	7.1	7.7	14.1	15.4	21.1	14.7
Tennessee	3.6	4.9	3.6	5.1	7.1	69.2	77.9	72.8	78.5	76.2	13.2	15.4	14.5	15.4	16.7	16.4	32.6	31.0	31.8	26.0
Texas	3.8	4.8	5.1	5.7	8.6	54.0	55.1	56.4	57.0	65.5	(1)	12.4	14.5	13.1	14.5	13.3	30.2	26.4	20.7	24.3
Utah	---	---	4	2	---	12.3	11.6	15.8	16.3	18.3	7.2	6.2	4.9	5.3	6.9	8.5	8.8	19.8	12.8	9.4
Vermont	---	---	---	---	---	30.2	38.1	36.5	39.0	37.1	4.6	7.8	7.2	7.3	7.6	7.8	17.6	12.8	25.9	14.2
Virginia	1.9	1.7	2.1	2.2	4.2	56.4	59.5	58.5	60.0	66.5	15.3	15.6	17.7	17.6	20.0	11.8	28.2	25.1	22.2	19.1
Wyoming	---	4	---	4	---	16.4	14.9	15.9	22.9	23.2	11.2	16.8	14.8	14.1	12.2	10.8	23.6	10.7	11.8	12.6
Hawaii	---	---	---	---	---	62.5	60.2	61.2	66.9	65.1	13.5	(1)	11.1	16.8	21.2	3.7	2.6	8.5	3.8	5.4

(1) Data not available

TABLE 5.—*Trend of death rates for various causes per 100,000 population, 1938–42*—Continued

State	Pneumonia, all forms (107-109)					Cancer, all forms (45-55)					Diabetes mellitus (61)					Intracranial lesions of vascular origin (83)				
	1942	1941	1940	1939	1938	1942	1941	1940	1939	1938	1942	1941	1940	1939	1938	1942	1941	1940	1939	1938
Colorado	78	66	78	88	102	124	111	119	113	113	18.5	15.9	18.2	18.2	17.1	96	84	86	87	86
Connecticut	25	28	38	42	51	132	131	136	139	143	28.0	31.3	22.8	29.2	30.1	80	79	99	82	88
Delaware	52	54	58	70	69	122	119	131	109	118	33.0	27.7	31.8	33.7	33.7	104	100	106	115	98
District of Columbia	62	66	80	72	87	135	144	151	156	138	28.4	24.9	32.2	26.8	26.0	70	80	93	84	84
Florida	51	49	56	56	69	99	103	94	93	84	20.0	20.8	19.5	20.6	18.2	111	111	112	99	96
Georgia	53	53	63	69	85	69	66	61	61	61	12.1	12.0	10.9	11.4	13.1	94	96	94	93	85
Idaho	53	33	41	57	76	92	93	89	89	83	16.1	20.0	17.8	20.0	13.7	92	80	62	61	61
Illinois	40	40	47	54	59	148	146	143	142	137	30.7	28.7	33.3	30.0	27.7	84	80	82	75	74
Indiana	51	49	59	69	71	129	122	122	112	114	14.5	14.5	14.7	16.6	16.1	144	137	141	132	123
Iowa	38	41	49	50	61	146	131	130	125	129	25.8	24.3	26.5	24.5	22.0	114	103	106	103	100
Kansas	33	37	36	44	51	132	124	122	124	124	26.8	24.7	26.0	26.7	24.6	119	108	101	101	102
Kentucky	61	58	62	73	76	86	85	83	81	74	15.5	16.1	14.3	13.0	13.3	91	95	104	107	100
Louisiana	53	60	77	80	91	87	85	88	77	81	16.2	15.5	18.1	16.3	16.2	71	67	68	68	64
Maine	55	56	55	74	76	151	156	152	152	151	29.4	32.1	31.1	27.3	27.5	127	127	129	127	116
Maryland	61	58	62	68	75	133	141	138	132	129	29.5	30.8	31.3	29.2	27.1	91	89	97	96	97
Massachusetts	58	61	61	71	74	176	177	171	160	160	35.0	36.4	36.5	35.1	33.3	110	106	106	103	98
Michigan	42	41	47	54	57	115	116	118	117	114	26.1	33.0	26.6	26.2	25.3	87	86	90	83	86
Montana	49	48	59	66	75	124	116	111	115	98	13.2	14.2	11.6	17.2	17.7	102	99	96	90	92
Nebraska	37	36	47	52	55	136	128	125	118	122	28.3	26.3	26.8	25.0	25.4	97	103	114	91	85
Nevada	66	50	70	82	103	102	107	115	112	102	12.5	16.8	20.8	16.6	12.2	95	67	66	67	77
New Mexico	62	57	58	84	79	52	57	58	53	53	8.8	10.8	9.4	8.6	7.2	41	42	40	39	43
New York	42	44	46	55	62	173	161	158	154	132	41.6	40.7	40.5	39.1	35.5	78	74	72	67	63
North Carolina	49	56	57	61	78	64	61	58	56	55	12.9	12.5	13.6	13.8	10.9	89	82	85	80	82
North Dakota	35	37	40	55	55	99	95	96	98	95	21.6	19.9	25.6	21.9	21.0	79	75	69	78	69
Ohio	46	44	56	60	61	137	137	135	132	128	31.0	29.0	31.2	29.2	27.0	112	105	111	108	104
Oklahoma	49	51	57	61	62	96	86	83	79	75	16.3	15.2	14.0	14.7	13.8	95	81	81	86	75
Pennsylvania	43	43	51	50	60	130	126	124	123	121	33.9	34.3	35.4	33.8	31.1	90	86	84	83	83
Rhode Island	51	44	54	57	79	151	150	157	151	155	38.8	38.1	38.7	36.9	40.4	103	88	100	88	94
South Dakota	43	40	37	55	56	114	104	105	104	91	22.6	26.7	23.9	26.7	19.6	90	85	82	76	71
Tennessee	55	62	71	71	81	78	87	74	71	73	12.9	12.4	14.0	13.4	11.1	87	80	83	81	81
Texas	42	47	53	53	69	81	80	76	68	73	12.8	13.1	13.6	11.8	11.9	65	61	62	61	69
Utah	32	31	44	45	63	95	87	91	92	85	13.9	19.6	19.6	18.3	19.9	67	61	58	54	52
Vermont	54	46	70	79	79	146	145	137	140	133	27.3	30.1	27.6	32.6	30.7	127	116	119	116	111
Virginia	57	59	70	67	72	84	83	81	80	81	18.3	19.0	20.3	17.5	16.6	102	102	104	104	97
Wyoming	41	45	39	50	63	85	86	85	75	83	15.5	12.4	14.3	16.5	13.8	61	70	66	58	57
Hawaii	44	39	46	54	75	65	77	67	71	67	16.5	20.2	14.4	16.6	16.8	46	53	44	48	55

State	Diseases of the heart (90–95)					Nephritis, all forms (130–132)					All accidents, including automobile accidents (169–195)					Automobile accidents (170a, b, c)				
	1942	1941	1940	1939	1938	1942	1941	1940	1939	1938	1942	1941	1940	1939	1938	1942	1941	1940	1939	1938
Colorado	277	276	250	255	236	78	79	71	73	84	93	77	91	87	89	26.2	28.3	32.7	28.6	30.6
Connecticut	308	308	299	296	255	59	61	56	76	81	56	61	55	61	72	14.4	21.6	18.0	20.7	19.8
Delaware	367	350	355	363	366	125	134	134	107	105	78	82	79	72	80	24.0	34.3	34.4	36.3	29.1
District of Columbia	283	298	347	344	342	91	102	110	105	102	66	70	72	76	65	15.0	23.2	22.2	22.8	20.7
Florida	270	285	285	244	242	81	88	89	91	91	104	110	96	93	93	26.4	39.6	36.9	36.5	39.4
Georgia	172	182	191	167	166	104	105	104	92	110	67	69	64	56	67	22.0	29.4	24.8	19.9	24.9
Idaho	269	219	243	242	203	62	62	57	53	55	98	98	101	97	88	23.1	37.9	36.4	33.7	33.5
Illinois	366	340	350	339	316	82	86	92	92	92	65	77	74	71	75	20.3	32.2	29.6	28.4	27.7
Indiana	266	289	304	250	238	82	67	74	65	65	81	90	82	72	74	28.1	40.5	33.4	29.3	31.6
Iowa	299	280	280	268	246	63	58	64	54	57	69	67	64	66	66	16.7	23.4	20.0	19.4	19.1
Kansas	301	287	275	259	247	89	96	96	97	96	79	81	75	104	107	21.3	30.5	27.2	23.1	24.6
Kentucky	233	227	216	218	188	79	78	74	66	72	69	81	78	77	66	17.9	30.7	26.0	23.0	22.0
Louisiana	231	245	251	215	201	70	84	87	91	93	47	70	68	64	66	18.1	27.8	23.2	20.3	20.7
Maine	368	378	361	377	344	88	91	88	81	84	83	82	75	72	69	19.0	26.1	23.6	22.1	22.2
Maryland	347	336	347	314	309	109	117	128	119	125	79	79	79	70	69	23.1	30.7	28.3	22.0	21.7
Massachusetts	421	432	422	407	373	62	63	70	67	69	76	67	61	63	61	13.6	18.4	15.2	15.4	15.4
Michigan	288	291	295	287	274	49	53	54	54	55	66	82	75	72	71	24.1	39.1	32.6	27.3	27.5
Montana	295	251	238	232	209	61	58	57	58	57	91	104	94	94	102	20.9	36.8	27.7	27.1	24.1
Nebraska	277	240	234	210	223	68	66	64	66	61	69	65	65	69	59	17.7	21.1	19.9	21.3	17.4
Nevada	339	283	310	264	267	56	49	59	41	72	212	217	173	200	135	84.3	95.6	76.8	69.9	56.2
New Mexico	127	119	116	109	113	48	50	47	44	51	87	102	88	85	80	31.3	42.8	39.8	38.6	23.9
New York	418	396	384	367	356	59	60	66	66	69	62	64	62	62	63	16.4	20.0	18.0	17.8	18.3
North Carolina	170	166	152	162	164	84	87	96	82	88	69	74	65	65	63	24.9	38.0	27.5	26.2	25.1
North Dakota	188	209	206	206	160	45	47	44	41	44	48	65	54	52	56	16.0	19.3	18.1	14.4	14.0
Ohio	324	313	315	298	277	77	73	77	76	76	81	89	87	83	81	26.1	35.2	29.7	27.7	27.4
Oklahoma	204	189	162	152	140	58	58	62	55	62	73	64	57	82	73	17.1	22.8	19.7	22.2	23.8
Pennsylvania	353	338	335	324	313	87	84	94	82	83	53	58	57	55	60	15.4	19.6	17.2	16.7	17.6
Rhode Island	385	378	373	363	353	84	98	98	96	102	59	56	51	51	91	11.0	12.4	12.2	10.9	11.3
South Dakota	230	217	207	201	172	52	57	48	43	41	68	76	65	55	66	15.1	25.5	19.5	21.5	21.4
Tennessee	183	179	187	174	163	61	66	65	60	64	60	66	62	62	62	17.4	24.2	18.6	19.4	19.8
Texas	191	189	179	166	119	60	63	58	53	56	71	72	69	62	72	21.4	30.7	27.0	23.3	28.3
Utah	254	244	246	233	224	54	51	50	54	52	93	86	84	79	94	29.8	38.0	33.4	29.8	39.8
Vermont	372	366	332	360	302	78	83	77	80	81	51	64	61	66	69	12.8	22.7	19.2	22.0	20.6
Virginia	237	249	248	246	237	85	98	105	85	84	79	92	83	74	71	24.5	39.0	31.1	30.2	25.2
Wyoming	240	228	201	209	207	66	67	53	70	55	114	119	106	113	109	32.8	51.8	53.7	47.4	39.4
Hawaii	134	135	129	126	127	59	53	67	65	63	107	69	55	48	59	21.8	19.8	13.9	14.2	18.3

In the past these preliminary reports have provided an early index of the trend of mortality for the country as a whole. While some deviation from the final figures for individual States may be expected, it is believed that trends of mortality within each State are reasonably accurate. Comparisons of specific causes of death among the States are subject to error because of differences in classification and tabulation procedures and in the completeness of these prompt reports. Such comparisons should be made from final figures published by the Bureau of the Census.

Populations of the different States used in computing rates were as follows: 1940—total U. S. Census enumerated population as of April 1, 1940; 1938 and 1939—official U. S. Census Bureau estimates of total population as of July 1 of each year, based on 1930 and 1940 census enumerations; 1942—official U. S. Census Bureau estimates of civilian population, based on sugar rationing data; 1941—mean of the above populations for 1940 and 1942. Although deaths in the armed forces in the continental United States are presumably included in these provisional data, it was not possible to include soldiers in the 1942 estimates of population; in 1940 the military population was negligible. With the extensive internal migration that has taken place since 1940, it seemed better to use the 1942 estimates even though they excluded the military populations.

GENERAL, INFANT, AND MATERNAL MORTALITY AND THE BIRTH RATE

For the year as a whole the death rate for 1942 was the same as in 1941—in fact, the rate was 10.5 per 1,000 for all 5 years included in table 2, except 1940 when it was 10.6. Of the 35 States included, 17 had a lower death rate in 1942 than in 1940, 17 had a higher rate, and in 1 State the rate was the same. Considered by quarters (table 3), the death rate from all causes in the first quarter of 1942 was below the same quarter of the two preceding years; in the second and third quarters the rates for 1942 were the same as in 1941; but in the fourth quarter the rate for 1942 was definitely above both 1941 and 1940.

It should be remembered in considering present mortality trends that a large number of healthy males of ages having low mortality rates are being withdrawn from the civilian population. This withdrawal of the young means that a larger percentage of the remaining population is in the older ages; therefore, the crude death rates for all ages may be increased without corresponding increases in the age specific death rates.

The infant mortality rate of 44 per 1,000 live births in 1942 was the lowest on record and represents a decline of more than 10 percent during the past 5 years. Twenty-seven of the 33 States reporting on infant mortality had lower rates in 1942 than in 1941.

The maternal mortality rate declined for the thirteenth consecutive year; the rate for 1942, 2.7 per 1,000 live births, was about 10 percent below the level of 1941, and 36 percent below the rate of 4.2 for 1938. Twenty-three of the 33 States reporting on maternal mortality had lower rates in 1942 than in 1941. The continuous decline since 1930 is in contrast to the two preceding decades during which there was little or no decrease in maternal mortality in the United States.

The birth rate was relatively high during 1942, 19.5 per 1,000 total population. With the exception of a slight drop in 1939, the birth rate has increased in every year since 1936. The rate for 1942 represents an increase of approximately 17 percent since 1936. Thirty-two of the 33 States reporting on births had higher rates in 1942 than in 1941. The greatest increases occurred in the southern and southwestern States.

DISEASES WITH LOWER DEATH RATES IN 1942 THAN IN 1941

For the following diseases the provisional mortality rates for the 35 reporting States were not only lower than in 1941 but were the lowest in the past 5 years: typhoid and paratyphoid fever, diarrhea and enteritis under 2 years, diphtheria, scarlet fever, influenza, pneumonia, whooping cough, and tuberculosis. The measles rate was lower in 1942 than in 1941, but was higher than in 1939 and 1940, while for poliomyelitis and encephalitis the rates were the lowest in 3 years.

When considered by quarters, some of the diseases that showed decreases for the year as a whole did not show decreases for every quarter. Tuberculosis was lower in each quarter of 1942 than in 1940 but in the last quarter of 1942 it was slightly higher than in the last quarter of 1941. While the increase was small, it represents a situation which should be watched. Quarterly rates for other causes may be seen in table 3.

There was a slight increase in deaths from influenza during the last quarter of 1942 over the corresponding period in 1941, but no epidemic of this disease was manifest during the year; the annual death rate (8.2 per 100,000 population) was the lowest on record since 1914. The annual pneumonia rate varied only about 2 percent from that of 1941, but it represented the lowest mortality from this disease in the 5 years included in table 1. The pneumonia rate in the first quarter of 1942 was well below the first quarter of the two preceding years; the second and third quarters were approximately the same as in the same quarters of 1941; but the rate in the last quarter of 1942 was well above that for 1941. As noted in connection with influenza, no epidemic situations were manifest during the year. Each of the 35 States reported a lower rate from influenza in 1942 than in 1941; 16 States reported a lower rate

520063°—43——4

from pneumonia in 1942 than in 1941, 16 a higher rate, and in 3 States the rate was the same in the two years.

Other diseases with relatively low death rates in 1942 were dysentery, malaria, pellagra and syphilis.

DISEASES WITH HIGHER DEATH RATES IN 1942 THAN IN 1941

The principal diseases for which a higher mortality rate was reported in 1942 than in 1941 were cancer, diseases of the heart, cerebral hemorrhage, and diabetes. In addition there was a rather sharp rise in the number of cases of meningococcus meningitis during the month of December which no doubt is responsible for the relatively high mortality rate from that disease. The increases in the death rates from meningococcus meningitis were from widely scattered areas. Of the 35 States included in this report, 18 reported an increase in 1942 over the 1941 death rate, 13 a decrease, and in 4 States the rate was the same as in 1941.

The other diseases with higher rates in 1942 are primarily diseases of adult life and old age, and part of the increased mortality is due to the aging population. Of the 4 diseases, cerebral hemorrhage increased about 5 percent, but heart disease, cancer, and diabetes increased less than 3 percent over 1941.

ACCIDENTAL DEATH RATES

The mortality from all accidents, including automobile accidents, was about 7 percent lower in 1942 than in 1941, but for automobile accidents alone the rate declined almost 30 percent. The automobile death rate was lower in 1942 than in 1941 in every one of the 35 States. A decrease in the number of fatalities from automobile accidents was anticipated in 1942 since the rationing of gasoline and tires was in effect during a considerable part of the year. Considering accidents other than automobile, the death rate for 1942 was higher than in any of the 5 years included in the table.

DEATHS DURING WEEK ENDED APRIL 24, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Apr. 24, 1943	Corresponding week, 1942
Data for 90 large cities of the United States:		
Total deaths	9,338	8,848
Average for 3 prior years	8,418	
Total deaths, first 16 weeks of year	160,113	146,156
Deaths under 1 year of age	625	565
Average for 3 prior years	541	
Deaths under 1 year of age, first 16 weeks of year	11,122	9,156
Data from industrial insurance companies:		
Policies in force	65,493,588	64,965,053
Number of death claims	12,121	12,361
Death claims per 1,000 policies in force, annual rate	9.7	9.9
Death claims per 1,000 policies, first 16 weeks of year, annual rate	10.6	10.2

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 1, 1943

Summary

Reports for the current week show totals above the preceding week's figures for all of the nine common communicable diseases included in the following tables except influenza. However, the increases are slight, totals for most of the diseases remaining below or only slightly above the corresponding 5-year (1938–42) medians.

The total number of meningococcus meningitis cases reported for the current week is 591, as compared (after reallocation of delayed reports) with 569 for the preceding week and an average of 598 for the past 3 weeks. Increases over the preceding week's figures were shown in the Middle Atlantic, East and West North Central, and the South Atlantic groups of States; in the New England group the number was the same as for the preceding week (64); and decreases were recorded in the 4 other areas. As compared with the averages for the preceding 3 weeks, decreases were shown in all areas except the Middle Atlantic and East North Central groups. States reporting 20 or more cases for the current week (last week's figures in parentheses) were as follows: New York, 76 (76); New Jersey, 47 (23); Pennsylvania, 36 (29); California, 34 (48); Massachusetts, 30 (27); Illinois, 29 (22); Virginia, 26 (24); Michigan, 23 (38); Missouri, 22 (14); Maryland, 22 (20); Texas, 21 (3). The peak of incidence of this disease was recorded as late as in May only twice in the past 16 years (1928 and 1935, with totals for the peak weeks, respectively, of 187 and 179). A total of 8,212 cases has been reported to date this year.

A total of 97 cases of typhoid and paratyphoid fevers, including 32 cases of paratyphoid fever in Massachusetts, was reported for the current week, as compared with 80 for the preceding week and a 5-year median of 91. Poliomyelitis cases totaled 28 (including 7 in California and 5 in Texas), as compared with 23 last week and a 5-year median of 17. Of 35 cases of smallpox, 13 occurred in Ohio. One case of psittacosis was reported in Pennsylvania.

Deaths recorded for the week in 90 large cities of the United States aggregated 9,986, as compared with 9,338 for the preceding week and a 3-year (1940–42) average of 8,495. The accumulated total for the first 17 weeks of the year is 170,099, as compared with 154,794 for the same period of last year.

Telegraphic morbidity reports from State health officers for the week ended May 1, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1938-42	Week ended		Median 1938-42	Week ended		Median 1938-42	Week ended		Median 1938-42
	May 1, 1943	May 2, 1942		May 1, 1943	May 2, 1942		May 1, 1943	May 2, 1942		May 1, 1943	May 2, 1942	
NEW ENG.												
Maine	0	1	1	1	1	1	24	148	148	7	3	1
New Hampshire	3	0	0	------	------	------	54	22	22	1	2	0
Vermont	0	0	0	------	------	------	278	134	84	3	0	0
Massachusetts	4	3	3	------	------	------	1, 688	1, 559	1, 028	30	5	2
Rhode Island	0	1	1	------	------	------	4	323	26	12	1	0
Connecticut	1	0	0	------	------	3	481	447	380	11	2	0
MID. ATL.												
New York	20	20	20	[1] 8	[1] 7	[1] 15	3, 145	611	1, 705	76	18	4
New Jersey	4	5	6	13	5	7	2, 485	817	817	47	1	1
Pennsylvania	18	7	28	2		------	2, 010	1, 297	1, 297	36	6	6
E. NO. CEN.												
Ohio	10	4	8	19	7	7	568	380	380	17	1	1
Indiana	6	3	8	2	11	16	688	148	148	12	0	0
Illinois	22	23	23	13	4	12	1, 900	620	620	29	1	2
Michigan [2]	7	1	2	1		14	2, 603	438	674	23	0	0
Wisconsin	1	0	1	26	52	52	1, 703	1, 183	1, 193	15	1	1
W. NO. CEN.												
Minnesota	3	1	2	4	1	2	322	1, 015	212	6	0	0
Iowa	2	7	3	------	1	1	334	273	268	1	0	0
Missouri	1	1	2	3	3	4	276	473	420	22	2	2
North Dakota	0	3	1	4	7	9	67	42	45	1	0	0
South Dakota	0	0	0	------	------	1	104	20	14	0	0	1
Nebraska	1	7	3	7	13	------	270	363	137	1	0	0
Kansas	3	3	6	2	1	7	532	616	616	8	0	0
SO. ATL.												
Delaware	0	0	0	------	------	------	110	13	13	3	1	0
Maryland [2]	6	4	3	10	3	8	327	489	348	22	7	1
Dist. of Col.	0	0	3	1	------		132	84	84	5	4	0
Virginia	2	5	9	221	162	175	381	180	423	26	1	1
West Virginia	0	2	7	9	14	20	133	78	78	5	2	2
North Carolina	4	5	5	7	38	14	321	686	716	15	1	1
South Carolina	4	3	4	387	291	291	63	150	150	13	1	1
Georgia	1	10	6	29	29	29	352	211	211	7	0	0
Florida	3	2	4	15	1	8	67	363	259	7	0	0
E. SO. CEN.												
Kentucky	2	6	6	8	1	5	309	142	142	16	2	2
Tennessee	2	2	3	29	51	60	376	168	168	7	4	2
Alabama	7	2	8	149	65	65	141	263	283	8	4	3
Mississippi [2]	5	3	5	------	------	------	------	------	------	7	0	0
W. SO. CEN.												
Arkansas	4	4	4	39	44	92	152	133	133	[3] 20	1	1
Louisiana	1	5	8	1	3	11	48	320	67	2	1	0
Oklahoma	8	2	2	32	46	76	42	242	184	2	0	1
Texas	20	24	24	721	544	544	739	1, 720	1, 260	21	4	2
MOUNTAIN												
Montana	2	2	2	22	1	4	197	158	49	0	0	0
Idaho	0	0	0	2	------	1	209	28	29	4	0	0
Wyoming	0	0	2	2	116	------	187	86	52	0	0	0
Colorado	12	8	9	27	22	14	748	308	356	4	0	0
New Mexico	0	5	1	5	------	------	12	72	72	0	0	0
Arizona	0	0	1	88	89	73	83	178	89	3	0	0
Utah [2]	0	0	1	5	5	7	154	1, 446	334	5	0	0
Nevada	0	0	------	------	------	------	33	0	------	0	0	------
PACIFIC												
Washington	6	1	1	3	2	------	458	318	318	8	2	0
Oregon	4	0	2	35	17	17	362	190	190	9	0	0
California	15	6	18	80	84	81	854	6, 524	812	34	2	1
Total	214	191	247	2, 032	1, 741	1, 741	26, 526	25, 479	25, 479	[3] 611	80	56
17 weeks	4, 554	4, 878	5, 970	68, 336	71, 036	138, 406	314, 834	305, 155	305, 155	[3] 8, 212	1, 311	854

See footnotes at end of table

Telegraphic morbidity reports from State health officers for the week ended May 1, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median, 1938–42	Week ended		Median, 1938–42	Week ended		Median, 1938–42	Week ended		Median 1938–42
	May 1, 1943	May 2, 1942		May 1, 1943	May 2, 1942		May 1, 1943	May 2, 1942		May 1, 1943	May 2, 1942	
NEW ENG.												
Maine	0	1	0	23	18	10	0	0	0	0	0	0
New Hampshire	0	0	0	7	17	2	0	0	0	0	0	0
Vermont	0	0	0	6	2	13	0	0	0	0	2	0
Massachusetts	0	0	0	547	326	222	0	0	0	32	0	2
Rhode Island	0	0	0	39	19	15	0	0	0	0	0	0
Connecticut	0	0	0	124	36	93	0	0	0	0	0	1
MID. ATL.												
New York	3	0	0	595	478	538	0	0	0	4	8	8
New Jersey	0	0	0	173	153	236	0	0	0	0	0	1
Pennsylvania	2	0	1	282	513	393	0	0	0	3	3	7
E. NO. CEN.												
Ohio	0	0	1	317	283	340	13	0	0	1	5	3
Indiana	1	0	0	127	90	118	3	1	3	2	0	1
Illinois	3	0	0	239	191	483	2	1	3	0	2	3
Michigan [2]	0	0	0	133	148	326	0	0	4	1	2	3
Wisconsin	0	0	1	366	171	171	1	1	2	0	0	2
W. NO. CEN.												
Minnesota	0	1	0	48	72	72	0	0	3	0	1	1
Iowa	0	0	0	44	40	66	1	1	26	0	2	2
Missouri	0	0	0	48	87	87	0	1	8	5	1	1
North Dakota	0	0	0	3	9	12	0	0	3	0	0	0
South Dakota	0	0	0	8	18	15	0	0	0	0	0	0
Nebraska	0	0	0	32	19	19	2	0	0	0	0	0
Kansas	1	0	0	53	75	75	1	0	0	0	1	1
SO. ATL.												
Delaware	0	0	0	6	32	14	0	0	0	0	0	0
Maryland [2]	0	0	0	164	96	48	0	0	0	3	3	1
Dist. of Col.	0	0	0	20	13	18	0	0	0	0	1	0
Virginia	0	1	1	57	17	30	0	0	0	2	3	3
West Virginia	0	0	0	26	24	39	0	0	0	3	4	2
North Carolina	0	0	0	25	19	23	0	1	1	2	2	2
South Carolina	0	0	0	9	1	1	0	0	0	1	1	2
Georgia	0	2	2	12	15	6	0	1	0	2	8	3
Florida	0	0	0	10	5	6	0	0	0	2	6	1
E. SO. CEN.												
Kentucky	2	1	0	49	54	54	0	0	1	1	9	3
Tennessee	0	1	0	27	44	53	0	2	2	1	3	2
Alabama	1	2	2	2	13	12	1	1	1	1	0	2
Mississippi [2]	0	2	0	7	0	5	2	0	0	3	1	4
W. SO. CEN.												
Arkansas	0	0	0	24	1	6	0	2	3	1	1	1
Louisiana	0	0	0	9	4	5	0	1	1	1	7	8
Oklahoma	0	0	0	15	5	12	0	2	2	0	0	0
Texas	5	3	2	62	27	37	4	0	4	8	6	6
MOUNTAIN												
Montana	0	0	0	5	18	18	0	0	1	0	0	0
Idaho	0	0	0	42	0	7	0	0	0	1	0	1
Wyoming	0	0	0	29	5	5	0	0	0	0	1	0
Colorado	0	0	0	84	12	34	4	0	0	13	0	0
New Mexico	0	0	0	7	6	11	0	0	0	0	0	0
Arizona	1	0	0	4	2	8	0	0	0	0	0	1
Utah [2]	1	0	0	19	11	13	0	0	1	0	0	0
Nevada	0	0	-----	0	0	-----	0	0	-----	0	0	-----
PACIFIC												
Washington	1	0	0	44	32	35	0	0	1	1	0	0
Oregon	0	0	0	16	6	13	1	0	6	2	1	1
California	7	1	1	116	107	145	0	0	6	1	3	5
Total	28	15	17	4,104	3,334	4,386	35	15	76	97	87	91
17 weeks	429	358	358	67,902	66,364	81,757	459	377	1,237	979	1,303	1,346

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended May 1, 1943, and comparison with corresponding week of 1942 and 5-year median—Continued

Division and State	Whooping cough			Week ended May 1, 1943								
	Week ended		Median 1938-42	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	May 1, 1943	May 2, 1942			Amebic	Bacillary	Unspecified					
NEW ENG.												
Maine	48	17	19	0	0	0	0	0	0	0	0	0
New Hampshire	2	0	0	0	0	0	0	0	0	0	0	0
Vermont	23	37	23	0	0	0	0	0	0	0	0	0
Massachusetts	140	240	215	1	0	2	0	4	0	0	0	0
Rhode Island	28	39	20	0	0	0	0	0	0	0	0	0
Connecticut	50	83	70	0	1	0	0	0	0	0	0	0
MID. ATL.												
New York	190	499	486	0	6	23	0	0	0	0	0	0
New Jersey	187	350	211	0	0	0	0	0	0	0	0	0
Pennsylvania	248	246	246	0	0	0	0	0	0	0	0	0
E. NO. CEN.												
Ohio	190	171	229	0	0	0	0	0	0	0	0	0
Indiana	95	83	39	0	0	0	0	0	0	0	0	0
Illinois	126	217	125	0	0	0	0	2	0	0	0	0
Michigan [2]	227	150	196	0	0	2	0	0	0	0	0	0
Wisconsin	209	197	170	0	0	0	0	2	0	0	0	0
W. NO. CEN.												
Minnesota	104	40	44	0	1	0	0	0	0	0	0	0
Iowa	51	16	28	0	0	0	0	0	0	0	0	0
Missouri	24	16	16	0	0	0	0	0	0	0	0	0
North Dakota	1	3	16	0	0	0	0	0	0	0	0	0
South Dakota	8	0	4	0	0	0	0	0	0	0	0	0
Nebraska	22	3	16	0	0	0	0	0	0	0	0	0
Kansas	77	41	43	0	0	0	0	0	0	0	0	0
SO. ATL.												
Delaware	1	1	6	0	0	0	0	0	0	0	0	0
Maryland [2]	123	45	61	0	0	0	0	1	0	0	1	0
Dist. of Col.	33	27	22	0	0	0	0	0	0	0	0	0
Virginia	104	52	79	0	1	0	24	1	0	0	0	0
West Virginia	48	14	35	0	0	0	0	0	0	0	0	0
North Carolina	185	105	293	0	0	0	0	0	0	0	1	0
South Carolina	58	81	84	0	0	6	0	0	0	0	0	1
Georgia	50	32	28	0	1	2	0	0	0	0	2	9
Florida	44	30	30	0	1	0	0	0	0	0	0	2
E. SO. CEN.												
Kentucky	22	91	91	0	0	0	0	0	0	0	0	0
Tennessee	69	42	42	0	0	0	3	0	0	0	1	0
Alabama	66	16	39	0	0	0	0	1	0	0	1	6
Mississippi [2]	------	------	------	0	0	0	0	0	0	0	1	1
W. SO. CEN.												
Arkansas	39	13	33	0	1	13	0	0	0	0	0	0
Louisiana	6	12	12	0	2	0	0	0	0	0	0	3
Oklahoma	36	58	37	0	0	0	0	0	0	0	0	0
Texas	602	213	318	1	22	119	0	1	0	1	0	10
MOUNTAIN												
Montana	5	14	14	0	0	0	0	0	0	1	7	0
Idaho	1	0	7	0	0	0	0	0	0	0	0	0
Wyoming	0	19	3	0	1	0	0	0	0	4	1	0
Colorado	35	22	47	0	0	0	0	1	0	1	0	0
New Mexico	39	33	33	0	0	0	0	0	0	1	0	0
Arizona	19	24	31	0	0	0	26	0	0	0	0	0
Utah [2]	72	22	57	0	0	0	0	0	0	0	0	0
Nevada	0	0	------	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	45	56	81	0	0	0	0	0	0	0	0	0
Oregon	14	44	20	0	0	0	0	0	0	1	0	0
California	320	375	455	0	1	2	0	0	0	0	0	0
Total	4,081	3,889	3,889	2	38	169	53	13	0	9	15	32
17 weeks	68,264	65,384	69,070	25	510	3,288	782	189	8	26	284	788

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Delayed report of 20 cases in Arkansas for week ended Apr. 24, 1943, included.

WEEKLY REPORTS FROM CITIES

City reports for week ended April 17, 1943

This table lists the reports from 85 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENG.												
Maine:												
Portland	0	0	-----	0	4	0	0	0	2	0	0	7
New Hampshire:												
Concord	0	0	------	0	4	0	1	1	0	0	0	0
Vermont:												
Barre	0	0	------	0	1	0	0	0	1	0	0	0
Massachusetts:												
Boston	0	0	------	0	206	18	31	1	203	0	0	26
Fall River	0	0	----	0	123	0	0	0	2	0	0	6
Springfield	0	0	-----	0	5	1	2	0	75	0	0	0
Worcester	0	0	------	0	349	1	15	0	12	0	1	7
Rhode Island:												
Providence	0	0	1	1	2	6	3	0	13	0	0	43
Connecticut:												
Bridgeport	0	1	------	0	2	2	3	0	7	0	0	1
Hartford	0	0	-	0	22	1	12	0	4	0	0	0
New Haven	0	0	1	0	5	2	0	0	5	0	0	5
MID ATL.												
New York:												
Buffalo	0	0	------	2	98	2	11	0	16	0	0	18
New York	33	0	17	3	852	48	114	0	426	0	0	80
Rochester	0	0	----	0	98	3	2	0	8	0	0	21
Syracuse	0	0	-----	1	84	0	7	0	4	0	0	9
New Jersey:												
Camden	1	0	2	1	10	0	1	0	5	0	0	1
Newark	0	0	2	1	348	3	15	0	9	0	0	24
Trenton	0	0	------	0	91	0	2	0	6	0	0	1
Pennsylvania:												
Philadelphia	3	0	------	0	351	17	29	0	129	0	4	73
Pittsburgh	0	0	--	1	25	5	13	0	10	0	0	34
Reading	0	0	1	0	217	0	2	0	2	0	0	6
E. NO. CEN.												
Ohio:												
Cincinnati	0	0	-----	0	85	1	3	0	30	0	0	4
Cleveland	1	0	2	1	18	5	10	0	66	0	0	51
Columbus	0	0	1	1	52	0	0	0	17	0	0	3
Indiana:												
Fort Wayne	1	0	------	2	8	1	4	0	8	0	0	1
Indianapolis	4	0	------	2	232	5	6	0	23	0	0	29
South Bend	0	0	------	0	5	0	0	0	1	0	0	3
Terre Haute	0	0	-----	0	9	0	3	0	2	0	0	1
Illinois:												
Chicago	28	0	2	0	956	9	29	0	96	0	2	61
Springfield	0	0	------	0	14	0	3	0	1	0	0	1
Michigan:												
Detroit	2	0	------	0	1,188	19	13	0	33	0	2	101
Flint	0	0	-----	0	41	0	3	0	2	0	0	14
Grand Rapids	0	0	------	1	9	0	4	0	4	0	0	12
Wisconsin:												
Kenosha	0	0	------	0	1	0	0	0	5	0	0	2
Milwaukee	0	0	1	1	491	0	4	0	197	0	0	61
Racine	1	0	------	0	7	0	1	0	29	0	0	1
Superior	0	0	------	0	3	0	0	0	2	0	0	2
W. NO. CEN.												
Minnesota:												
Duluth	0	0	------	0	2	0	6	0	3	0	0	0
Minneapolis	2	0	------	0	98	2	4	0	33	0	0	21
St. Paul	0	0	------	0	5	0	8	0	5	0	0	44
Missouri:												
Kansas City	0	0	------	0	74	4	10	1	38	0	0	1
St. Joseph	0	0	------	1	2	0	2	0	0	0	0	1
St. Louis	0	0	2	2	50	9	18	0	11	0	0	14
Nebraska:												
Omaha	0	0	------	0	8	1	2	0	8	0	0	1
Kansas:												
Topeka	0	0	------	0	236	0	0	0	2	0	0	23
Wichita	1	0	------	0	170	0	6	0	0	0	0	10

City reports for week ended April 17, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
SO. ATL.												
Delaware:												
Wilmington	0	0		0	13	4	2	0	0	0	0	1
Maryland:												
Baltimore	0	0	2	2	110	8	16	0	71	0	0	90
Cumberland	0	0		0	0	0	1	0	0	0	0	0
Frederick	0	0		0	1	0	0	0	0	0	0	0
Dist. of Col.:												
Washington	0	0	1	1	83	2	15	0	16	0	1	28
Virginia:												
Lynchburg	0	0		1	6	0	0	0	0	0	1	8
Richmond	0	0	2	1	15	4	5	0	5	0	0	0
Roanoke	0	0		0	0	0	1	0	0	0	0	0
West Virginia:												
Wheeling	0	0		0	54	0	3	0	5	0	0	4
North Carolina:												
Wilmington	0	0		0	33	4	3	0	0	0	0	10
Winston-Salem	0	0		0	0	0	4	0	2	0	0	11
South Carolina:												
Charleston	0	0	18	0	1	1	0	0	1	0	0	2
Georgia:												
Atlanta	1	0	13	0	31	0	9	0	5	0	0	7
Brunswick	0	0		0	2	0	2	0	0	0	0	3
Savannah	0	0	3	1	2	1	0	0	0	0	0	2
Florida:												
Tampa	0	0	1	1	5	0	2	0	2	0	0	0
E. SO. CEN.												
Tennessee:												
Memphis	0	0	5	3	171	3	2	0	4	0	0	10
Nashville	0	0		1	40		4	0	2	0	0	4
Alabama:												
Birmingham	1	0	5	1	10	0	6	1	1	0	0	1
Mobile	1	0	1	1	3	0	1	0	1	0	0	0
W. SO. CEN.												
Arkansas:												
Little Rock	0	0	4	0	10	0	2	0	0	0	0	1
Louisiana:												
New Orleans	1	0	4	2	42	1	5	0	5	0	1	4
Shreveport	0	0		0	0	1	1	0	2	0	0	0
Texas:												
Dallas	1	0		0	3	2	2	0	0	0	0	11
Galveston	0	0		0	1	0	1	0	1	0	0	0
Houston	2	0		0	10	1	9	1	1	0	0	11
San Antonio	2	0	6	4	6	0	2	0	0	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0		0	0	0	0	0	2	0	0	0
Great Falls	0	0		0	28	0	2	0	0	0	0	2
Missoula	0	0		0	10	0	2	0	0	0	0	0
Idaho:												
Boise	0	0		0	4	0	0	0	0	1	0	0
Colorado:												
Denver	3	0	13	0	495	3	4	0	7	0	0	2
Pueblo	0	0		0	9	1	0	0	2	0	0	9
Utah:												
Salt Lake City	0	0		0	94	1	0	0	4	0	0	36
PACIFIC												
Washington:												
Seattle	1	0		2	176	0	3	0	3	0	0	11
Spokane	0	0		0	114	0	1	0	0	0	0	1
California:												
Los Angeles	2	0	14	3	121	10	10	3	24	0	0	35
Sacramento	1	0		0	11	3	2	0	3	0	0	4
San Francisco	0	0	2	0	94	2	6	0	17	0	0	44
Total	93	1	126	45	8,472	217	530	8	1,741	1	12	1,177
Corresponding week, 1942	60	4	133	34	6,204	41	469	20	1,407	2	17	1,168
Average, 1938-42	76		215	[1] 38	[2] 6,000		[1] 442		1,620	10	19	1,038

Anthrax.—Cases: Philadelphia, 1.
Dysentery, amebic.—Cases: New York, 18; Rochester, 1; Detroit, 1.
Dysentery, bacillary.—Cases: New York, 1; St. Louis, 2; Charleston, S. C., 1; Missoula, 2; Los Angeles, 2.
Dysentery, unspecified.—Cases: San Antonio, 7.
Typhus fever.—Cases: Savannah, 1; New Orleans, 2; Houston, 1; San Antonio, 1.

[1] 3-year average, 1940-42.
[2] 5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 85 cities in the preceding table (estimated population, 1942, 34,498,400)

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
New England	0.0	2.5	5.0	2.5	1,796	77.0	166.0	5.0	805	0	2.5	236
Middle Atlantic	16.5	0	9.8	4.0	970	34.8	87.4	0	274	0	1.8	119
East North Central	21.6	0	3.5	4.7	1,821	23.3	48.5	0	301	0	2.3	203
West North Central	5.9	0	4.0	5.9	1,276	31.6	110.8	2.0	198	0	0	227
South Atlantic	1.8	0	70.0	12.3	628	42.0	110.3	0	187	0	3.5	291
East South Central	11.9	0	65.3	35.6	1,330	17.8	77.2	5.9	48	0	0	89
West South Central	17.6	0	41.1	17.6	211	14.7	64.5	2.9	26	0	2.9	82
Mountain	24.6	0	106.7	0	5,254	41.0	65.7	0	123	8.2	0	402
Pacific	7.3	0	29.0	9.1	937	27.2	39.9	5.4	85	0	0	172
Total	14.1	0.2	19.0	6.8	1,281	32.8	80.1	1.2	263	0.2	1.8	178

PLAGUE INFECTION IN CALIFORNIA AND WASHINGTON

Plague infection has been reported proved in specimens of tissue and pools of fleas from rodents in California and Washington as follows:

CALIFORNIA

Monterey County.—In pools of fleas and tissue from rodents collected on the Field Ranch, in Fort Ord Military Reservation, 12 miles southwest of Salinas, Monterey County, Calif., as follows: March 15, 186 fleas from 3 ground squirrels, *C. beecheyi;* March 18, 37 fleas from 16 meadow mice, *Microtus californicus;* March 19, 52 fleas from 27 mice, *Microtus californicus*, and 4 mice, *Peromyscus* sp.; and March 24–29, 83 fleas from 40 mice; 2 pools of organs, proved separately, from 2 lots of 10 mice each; 100 fleas from 47 mice; 65 fleas from 46 mice; and 40 fleas from 47 mice, all *Microtus* sp.; April 10, in organs from 10 mice, *Microtus* sp., collected in Fort Ord Military Reservation, Area C–2.

WASHINGTON

Pierce County.—Tacoma: In pools of fleas and tissue from rats, *R. norvegicus*, collected in frame buildings in industrial districts of Tacoma, Pierce County, Wash., as follows: April 5, in a pool of 38 fleas from 32 rats; and April 13, in tissue from 3 rats.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—During the week ended April 10, 1943, a rat proved positive for plague was reported in Paauhau area, Hamakua District, Island of Hawaii, T. H.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended April 3, 1943.—During the week ended April 3, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		18		85	211	37	28	24	48	451
Diphtheria		16	1	21	1	4	5			48
Dysentery (bacillary)				8						8
Encephalitis, infectious								1		1
German measles		3		18	78	3		8	14	124
Influenza		24	19		14	7	16		267	347
Measles		77	8	425	860	90	239	124	131	1,954
Meningitis, meningococcus	1			1	4	4	1			11
Mumps	2	135	4	65	1,437	147	109	134	178	2,211
Scarlet fever		13	53	98	283	32	59	32	23	593
Tuberculosis (all forms)	2	15	18	90	69	6		7	23	230
Typhoid fever and paratyphoid fever			1	33	1	1				36
Undulant fever				8						8
Whooping cough			1	127	243	73	4	33	26	507

CUBA

Habana—Communicable diseases—4 weeks ended April 3, 1943.—During the 4 weeks ended April 3, 1943, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	29	3	Tetanus	2	2
Malaria	2		Tuberculosis	4	
Measles	17		Typhoid fever	39	4
Scarlet fever	2				

Provinces—Notifiable diseases—4 weeks ended March 27, 1943.—During the 4 weeks ended March 27, 1943, cases of certain notifiable diseases were reported in the Provinces of Cuba, as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer		2	6	16		8	32
Chickenpox	1			1	3	26	31
Diphtheria		29	1			3	33
Hookworm disease		9					9
Leprosy		2	1			5	8
Malaria	5	2		24		223	254
Measles		20		3		3	26
Poliomyelitis	1	1		6	3		11
Scarlet fever		3	1			1	5
Tetanus, infantile				1			1
Tuberculosis	19	14	23	50	13	49	168
Typhoid fever	9	52	8	39	8	19	135

[1] Includes the city of Habana.

JAMAICA

Notifiable diseases—4 weeks ended April 10, 1943.—During the 4 weeks ended April 10, 1943, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis		1	Erysipelas		1
Chickenpox	12	14	Leprosy		4
Diphtheria	3	1	Tuberculosis	27	7[illegible]
Dysentery		2	Typhoid fever	4	4[illegible]

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during the current year. All reports of yellow fever are published currently

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones)

Plague

British East Africa—Uganda Protectorate.—Plague has been reported in Uganda Protectorate, British East Africa, as follows: Week ended March 13, 1943, 3 cases, 3 deaths; week ended March 20, 1943, 3 cases, 3 deaths.

Smallpox

Indochina.—For the period March 21–31, 1943, 432 cases of smallpox were reported in Indochina.

Typhus Fever

Algeria.—For the period March 21–31, 1943, 532 cases of typhus fever were reported in Algeria, including 59 cases in Algiers, 21 cases in Bone, and 18 cases in Mostaganem.

Hungary.—During the week ended April 10, 1943, 30 cases of typhus fever were reported in Hungary.

Iraq.—Typhus fever (endemic and epidemic) has been reported in Iraq as follows: Weeks ended March 13, 1943, 44 cases, 2 deaths; March 20, 49 cases, 2 deaths; March 27, 60 cases, 3 deaths; April 3, 92 cases, 5 deaths. In Basra Liwa, a total of 125 cases of typhus fever, with 11 deaths from the same cause, was reported for the period January 24 to April 17, inclusive, all but 1 case of which was of the endemic type.

Irish Free State—Leitrim County.—During the week ended April 3, 1943, 9 cases of typhus fever were reported in Leitrim County, Irish Free State. During the preceding week 7 cases of typhus fever were reported in the same county.

Rumania.—For the period April 8–15, 1943, 360 cases of typhus fever were reported in Rumania.

Spain.—For the week ended March 6, 1943, 11 cases of typhus fever were reported in Spain.

COURT DECISIONS ON PUBLIC HEALTH

Garbage—granting by city of exclusive right of removal and disposal.—(Texas Court of Civil Appeals; *City of Wichita Falls et al.* v. *Kemp Hotel Operating Co. et al.*, 162 S.W.2d 150; decided April 24, 1942, rehearing denied May 29, 1942.) The city of Wichita Falls passed an ordinance providing for the gathering and disposition of garbage in the city and entered into a contract with a person who submitted what was officially determined to be the lowest and best bid for the removal and disposition of such garbage. The contract gave the contractor the exclusive right for 5 years to gather and dispose of the garbage, while the ordinance contained a penal provision against all persons, other than the one to whom the contract was let, who gathered and hauled garbage. An action was brought against the city and others for injunctive relief from the enforcement of the ordinance and contract, and, on appeal by the defendants from an adverse judgment, the Court of Civil Appeals of Texas took the view that there were presented the questions (1) whether the gathering and disposition of garbage constituted a public utility, and (2) whether the ordinance and contract amounted to a franchise.

It was obvious, according to the court, that if a public utility franchise had been granted, such franchise was invalid because the applicable city charter provisions had not been complied with. The conclusion reached by the appellate court was that the performance of the ordinance and contract constituted a public utility but that neither the ordinance nor the contract, nor the two combined, constituted a franchise to the contractor. It was, therefore, held that the ordinance and contract were not void for want of compliance with the city charter. The court viewed the ordinance and contract as a means chosen by the governing body of the municipality to keep the city clear of deleterious substances for the promotion of health and to prevent the spread of disease and said that it thought it pertinent to further observe that those plaintiffs in the case "who operated eating places and had a property right in the waste food products which they could sell for swine food, could not assert those rights as against the imperative duty of the city to provide adequate protection to the health and welfare of the general public." Private rights in such instances, continued the court, are subordinate to those of the public.

Power of State board of health to adopt a merit system.—(Arizona Supreme Court; *Dunshee* v. *Manning, Superintendent of Public Health*, 129 P.2d 924; decided October 13, 1942.) In a mandamus proceeding in which the petitioner was successful in having the State Superin-

tendent of Public Health of Arizona directed to approve the petitioner's salary claim as an employee of the State public health department, it appeared that the petitioner had been employed under and governed by certain merit system regulations adopted by the Arizona Board of Health on June 4, 1940. One of the contentions of the respondent superintendent involved the question of the authority of the State board of health to adopt such a merit system. The Supreme Court of Arizona said that it was true that the public health code did not specifically authorize the board of health to prepare and put in force a merit system but held that the statutory provision that "The board shall make rules and regulations for the government of the board, its officers and its meetings" was sufficient to empower the board to adopt a merit system for the government of its own department.

County health department—creation—compliance with statute.—(Kentucky Court of Appeals; *Estill County et al.* v. *Noland, County Judge, et al.*, 167 S.W.2d 707; decided November 20, 1942, as extended on denial of rehearing January 15, 1943.) A county brought an action to enjoin the fiscal court of the county, the county court clerk, and the county treasurer from issuing and paying a county voucher for $1,400 to the State Board of Health of Kentucky to maintain a health department in the county for the current fiscal year. Section 212.040 of the Kentucky Revised Statutes authorized the creation of a county or district health department by resolution adopted at a regular term of the fiscal court and allowed the voters, within 30 days after such resolution was entered, to petition for an election to submit to the people of the county the question of whether or not such health department should be established. It was stipulated by the parties that the orders purporting to create the county health department were all entered at special meetings of the fiscal court but that a number of the said orders making appropriations for the maintenance of the department were made at regular fiscal court meetings.

In considering the question of whether the fact that the county health department was created by an order entered at a special term of the fiscal court was fatal, the Court of Appeals of Kentucky cited a former case holding that a county health department could not be created by a resolution adopted at a special term of the fiscal court and that a subsequent appropriation made by an order entered at a regular term to maintain such department was not a sufficient compliance with the statute concerning the establishment of a department. According to the appellate court, the above-mentioned stipulation clearly brought the instant case within the rule of the prior case and constrained the court to hold that an order entered at a regular term

making an appropriation for a *health department, which department had not been created* according to the statute, could not be construed as a resolution establishing a health department.

The court also considered the contention that, as the fiscal court's resolution appropriated the $1,400 to the State board of health to assist its program of immunization, aid, and treatment of the citizens of the county, a valid contract was made with the board under section 67.080 of the Kentucky Revised Statutes since subsection 8 thereof authorized the fiscal court to provide for the care and treatment of the sick and poor or contract with any hospital in the county to do so. The court answered this contention by pointing out (*a*) that the State board of health was not a hospital and was not located in the county, and (*b*) that there was no statutory authority for the board to contract with the fiscal court for medical aid to the citizens of the county except under section 212.040 et seq., providing for the establishment of a county health department. By this resolution, said the court, the fiscal court attempted to go around section 212.040 and through indirection sought to establish a county health department in a manner other than that section provided. "This it cannot do. In establishing a county health department it must follow the procedure outlined in the statutes."

Having concluded that no health department was created in compliance with the statute, the court said that it followed that the lower court erred in not enjoining payment of the voucher.

X

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

THE PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world, (2) articles relating to the cause, prevention, and control of disease, (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON · 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents.

Public Health Reports

VOLUME 58 MAY 14, 1943 NUMBER 20

IN THIS ISSUE

U.S. PUBLIC HEALTH SERVICE
1798

CONTENTS

Public Health Reports

Vol. 58 • MAY 14, 1943 • *No. 20*

ROCKY MOUNTAIN SPOTTED FEVER [1]

FURTHER EXPERIENCE IN THE THERAPEUTIC USE OF IMMUNE RABBIT SERUM

By NORMAN H. TOPPING, *Passed Assistant Surgeon, United States Public Health Service*

There have been several attempts reported in the literature to produce immune serum against the virus of Rocky Mountain spotted fever. One of the earliest was that of Ricketts and Gomez (1) in 1908. They reported that they were able to produce in guinea pigs a serum of neutralizing value only and that the antibody titer was not increased by a second injection of the antigen. Heinemann and Moore (2) published a preliminary note concerning immune serum in 1911, and followed this with a more detailed paper in 1912 (3). They reported the production in horses of a serum with neutralizing value, by using guinea pig passage virus as the antigen. The titer was perhaps increased by a second inoculation of guinea pig virus. They concentrated a small amount of this horse serum (similar to methods then in use for the concentration of diphtheria antitoxin) with an apparent increase in the neutralizing titer. The protocols do not demonstrate therapeutic value. Noguchi (4) reported in 1923 the preparation of an immune serum in rabbits (again using guinea pig passage virus for the antigen) that would protect if given simultaneously with the virus or during the incubation period. Some therapeutic value was possibly shown if the number of infectious doses in the challenge inoculation was greatly reduced. In another paper in 1923 he suggested a vaccine composed of guinea pig virus neutralized with this immune rabbit serum. Parker in 1933 in a letter to the editor of the Journal of the American Medical Association tells of an immune serum produced in a goat using tick virus as the antigen that probably had similar therapeutic value to our crude immune rabbit serum prepared with a like antigen. Parker states that he was unable to reproduce these results in a later experiment.

In a previous publication (*5*) the results of treatment of guinea pigs and monkeys infected with Rocky Mountain spotted fever by

[1] From the Division of Infectious Diseases, National Institute of Health.

the use of an immune rabbit serum were reported. This serum was prepared in rabbits employing infected ticks as the antigen. Most of the serum used in those experiments was crude rabbit serum in which no attempt had been made to purify or concentrate the antibody. However, a small amount had been treated sufficiently to indicate that the antibody could be purified and concentrated by the same methods that are applicable to the concentration and purification of antipneumococcus antibody. Following that report Kurotchin, Van der Scheer, and Wyckoff (*6*) reported the preparation of an immune rabbit serum with high neutralizing titer by the injection into rabbits of yolk sac highly infectious with the virus of Rocky Mountain spotted fever. They further determined that this rabbit serum could be refined by the same chemical procedures which are useful in purifying antipneumococcal rabbit serum. They also state that in such concentrates the neutralizing titer per gram of protein is increased about twentyfold as compared to the original serum.

It is the purpose of this communication to report on further experiences with the use of immune rabbit serum in the treatment of laboratory animals infected with the virus of Rocky Mountain spotted fever. In section 1 the serums used in the tests are from two sources and differ only in the antigen used for the active immunization of the rabbits. The methods of concentration and purification were identical. The "T" serum was prepared with tick antigen and the "L" serum was prepared by Kurotchin, Van der Scheer, and Wyckoff by the use of infected yolk sac material.

Section 2 has to do with the treatment of human cases of Rocky Mountain spotted fever during the summers of 1941 and 1942.

Section 1. Neutralization Tests

By serum virus neutralization tests the two serums were demonstrated to contain approximately the same antibody titer. The infectious agent in all these tests was plasma from guinea pigs infected with a highly virulent strain of spotted fever and since the minimal infectious dose varied with each animal it was necessary to control each test by titration of the virus. The tests are not comparable to each other because of the variation in the infecting virus, but each individual test is valid and it is entirely feasible to compare the antibody content of serums within the limitations of the test.

The results of one such test are presented in figure 1. The "T" serum and the "L" serum both prevented deaths in the test animals to a dilution of 10^{-4}. The "T" serum was a little more efficient in preventing fevers in the guinea pigs than the "L" serum, but on other tests the reverse has been true. In general, it can be said that there is apparently no great difference in the antibody content of rabbit

serums prepared by inoculating rabbits with either infected ticks or infected yolk sac material.

THERAPEUTIC ADMINISTRATION

Several tests were devised in order to ascertain the experimental therapeutic efficiency of the various lots of concentrated and refined serums. There were two main questions upon which data were desired. The first of these was to determine the amount of serum which was an effective therapeutic dose; the second, the time such a dose would be of benefit. The test guinea pigs were all males of approximately 500 gm.; the infecting dose was 1 cc. of whole citrated blood drawn from a guinea pig infected with a highly

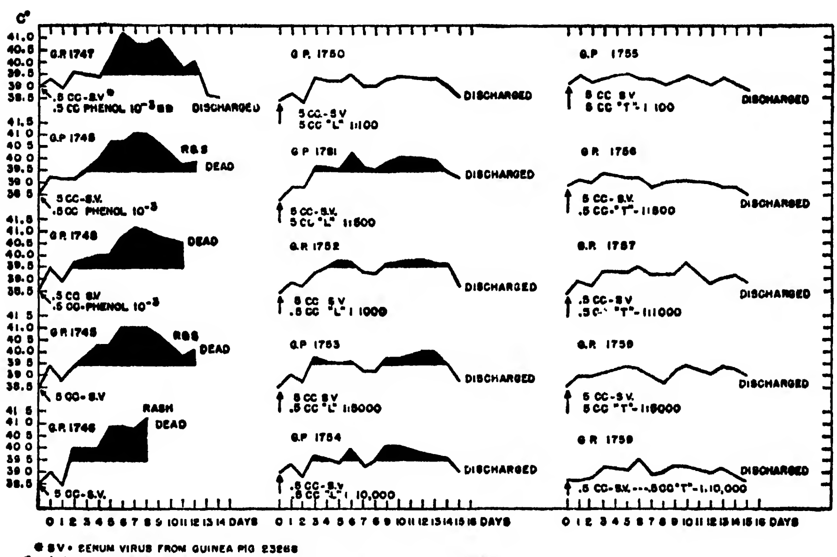


FIGURE 1.

virulent strain of Rocky Mountain spotted fever (the Bitter Root strain) inoculated intraperitoneally. In a preliminary test it was found that a single injection of 0.5, 0.25, or 0.1 cc. of concentrated rabbit serum administered on the first day of fever of the test guinea pig was effective in preventing death. A further experiment was run to see how late in the course of the guinea pig disease such a dose might be effective. The serum dose throughout this test was 0.5 cc. of "L" serum given subcutaneously and the time was varied from 24 up to and including 96 hours after the infecting inoculation. The 72-hour administration of serum occurred on the first day and the 96-hour on the second day of fever.

Figure 2 illustrates the results of this test. The six control guinea pigs all became severely ill, four of them died of the infection, and five

of the six developed scrotal reactions typical of the disease in guinea pigs when infected with a highly virulent strain of spotted fever. The sixth guinea pig died early, before his mates had developed scrotal lesions. In guinea pigs receiving the constant, relatively small dose of serum, the severity of the illness varied directly with the time from inoculation to the administration of the serum. If the serum was administered only 24 hours after the infecting dose, there was a complete suppression of recognizable spotted fever. If 48 hours elapsed, the disease was modified. Here guinea pig No. 2450 died too early to be typical spotted fever, as can be seen by comparison with

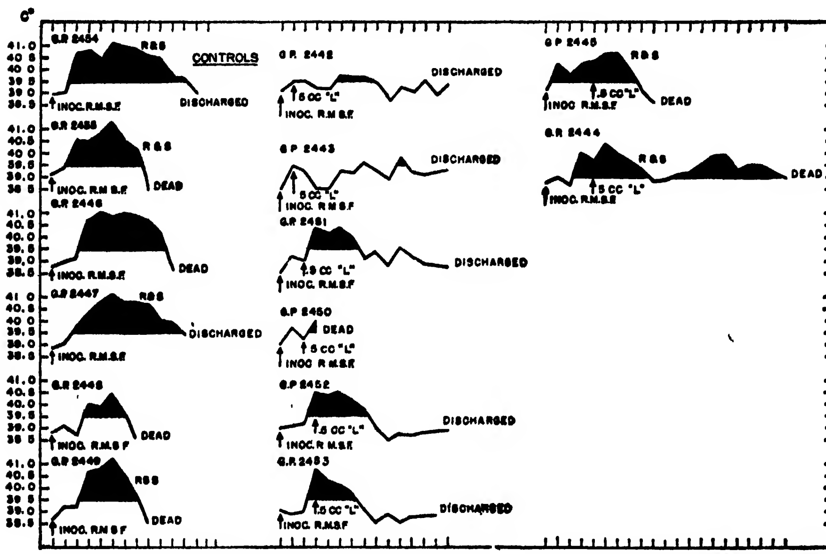


FIGURE 2.

the control animals. If the serum was given 72 hours after inoculation, which was the first day of fever, there was definite modification of the illness with survival. The scrotal lesions as seen in the controls did not occur in these two guinea pigs. If the serum was withheld for 96 hours following the infectious dose, which was on the second day of fever, there was little, if any, effect. Both animals died and both developed scrotal lesions. One animal, No. 2444, had a longer survival time than did the controls.

The same type experiment was done using monkeys as the test animal. The monkeys weighed approximately 8 pounds each and were infected intraperitoneally with 1 cc. of guinea pig passage virus. The concentrated "T" serum was administered intravenously in two dosage levels, 72, 96, and 120 hours after the infecting inoculation.

Figure 3 presents the monkeys' temperature records and the results of this experiment. Both control monkeys developed typical Rocky

Mountain spotted fever, which was fatal after 8 and 9 days, respectively. The two monkeys treated 72 hours after the infecting dose, which was the first febrile day, had a modified illness and both recovered. Neither of these monkeys appeared ill although one of them, No. 497, had considerable fever. The larger dose (4 cc.) of serum was more efficient in modifying the disease than was the smaller dose (2 cc.). In the two monkeys treated 96 hours after infection, which was the second day of fever, there was some prolongation of the disease, although both finally succumbed. They each survived for 12 days as compared to 8 and 9 for the controls. It was thought that perhaps a larger single dose might have been more efficient in these

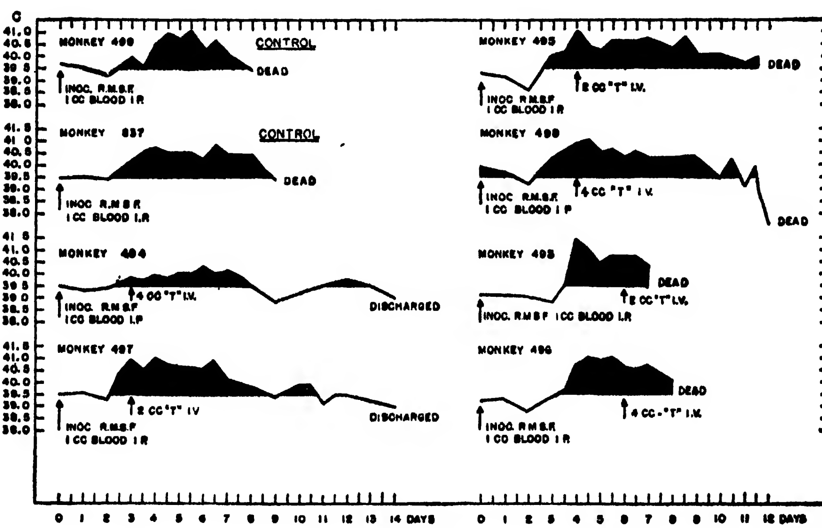


FIGURE 3.

two animals. No effect was seen in the two monkeys administered serum after a lapse of 120 hours following the infecting inoculation.

Since in some experiments it appeared that the relatively small amount of serum was inadequate to prevent death, but yet modified the disease, if more than 72 hours had elapsed from the time of the infecting inoculation, a further experiment was conducted increasing the serum dosage. The guinea pigs were again infected with 1 cc. of guinea pig passage virus intraperitoneally. The "L" serum was again administered subcutaneously, but at three levels—1 cc., 3 cc., and 5 cc. on the second day of fever in this test, 120 hours after the inoculation of the infecting dose. Figure 4 presents the temperature curves and results of the experiment. The six control guinea pigs all developed typical severe Rocky Mountain spotted fever and each of them developed the characteristic scrotal lesions associated with the disease in guinea pigs. Four of the six succumbed to the disease. The two

guinea pigs that received a dose of 1 cc. of concentrated serum both survived. One, No. 2488, developed typical scrotal lesions. The two receiving 3 cc. and the two receiving 5 cc. all recovered and none of them developed typical scrotal lesions.

As in the treatment of other diseases with immune serums, the time factor here is important. In guinea pigs it takes a relatively large dose to prevent death if given when the disease is in the second febrile day. In human beings the characteristic rash does not appear until the third or fourth day of fever. The question then is whether it will

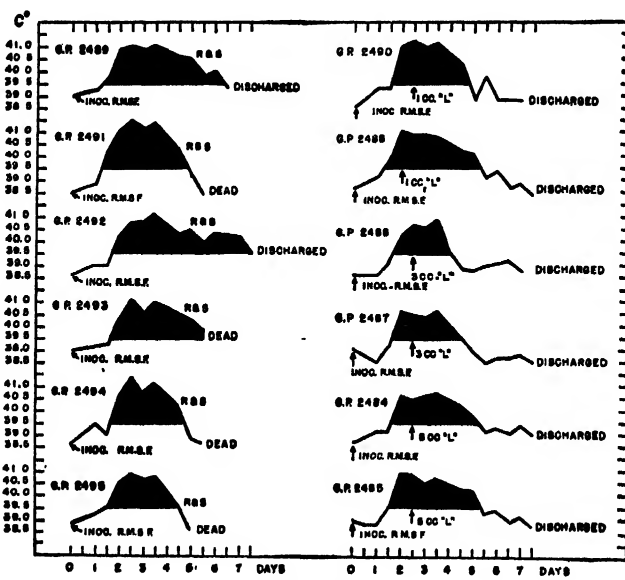


FIGURE 4.

be possible to await this diagnostic sign and still derive benefit from the serum. The experimental animals have in all probability received many times the infecting dose usually received by human cases. The disease in animals is certainly shorter than is the usual human case and for this reason the additional 24 to 48 hours may not be so important.

Section 2. Experience in Human Cases

The animal work with the immune rabbit serum was sufficiently encouraging to warrant its trial in human beings naturally infected with the virus of Rocky Mountain spotted fever. This work was begun in the late stage of the tick season in 1940 and was continued during the summers of 1941 and 1942. Cases were treated both in the eastern section of the country as well as in the West. None of these cases reported had been previously vaccinated against Rocky Mountain spotted fever.

The cases were diagnosed and treated by various doctors; in fact, but few were under the care of any one physician. Many of the eastern cases in Maryland and Virginia were seen by personnel from the National Institute of Health. Some of the cases were treated in the home and the others in hospitals. Other than for the immune serum no recommendations were made as to treatment, this being left entirely to the discretion of the attending physician. Several of the cases received one of the sulfonamides; one case received intravenous metaphen; at least one case received large doses of quinine; several had intravenous fluids; several had blood transfusions; and one had intravenous immune human serum in addition to the recommended dose of the immune rabbit serum. In this connection it has been shown that sulfanilamide and sulfapyridine are actually harmful when given to guinea pigs infected with Rocky Mountain spotted fever (*7*) (*8*), and a similiar observation has been reported in human beings (*9*). It is also thought, by those interested in Rocky Mountain spotted fever, that any form of intravenous medication may also be contraindicated. Parker states, "We have used glucose in guinea pigs with the usual result, namely, earlier death than in the controls."[2] Mainly because of this the immune rabbit serum in all of these reported cases was administered intramuscularly. It is recognized that with this method of administration the antibody is not so rapidly available as it is when adninistered intravenously and further that larger amounts are necessary to produce similar effects. Perhaps intramuscular administration was an unnecessary precaution, but until more is known, this seemed the safer procedure.

In the series to be reported there was no attempt made at any form of case selection. The only qualification necessary was that the case be early enough that the serum might be of some value. The serum was of the "L" lot described under the animal work. A supply was kept at the Rocky Mountain Laboratory in Hamilton, Mont., as well as at the National Institute of Health in Bethesda, Md. The dosage of serum recommended was 1 cc. per kilo of body weight although some patients received slightly more than this amount, while others received slightly less. The largest dose administered was 160 cc. and the smallest was 20 cc. The method of administration was briefly as follows: (1) a conjunctival test with normal rabbit serum was proposed for evidence of sensitivity to rabbit protein, if negative; (2) 1 cc. of serum concentrate was administered intramuscularly, if no reaction after about 10 minutes; (3) 5 cc. given intramuscularly, if no reaction after 10 minutes; (4) remainder of recommended dosage, up to total of 40 cc., given intra-

[2] Personal communication.

muscularly; (5) if more than 40 cc. was recommended, the remainder was to be given in one dose, intramuscularly 10 to 12 hours later.

Mainly during the summers of 1941 and 1942, 94 individual doses of anti-Rocky Mountain spotted fever serum were sent out upon request. After a lapse of approximately 1 month, follow-up letters asking for the case data were addressed to the physicians. Ten physicians failed to reply to the questionnaires so that no information is available on their ten cases. There were 84 case histories and other data submitted; of these, seven were not included in further analysis because they were thought not to be Rocky Mountain spotted fever. Brief abstracts of their case histories appear in appendix A. Four of the remaining 77 cases were not given the recommended dosage of serum. One of the four received approximately a sixth of the recommended dose and the other three about half the dose calculated on cc./kg. body weight. Brief abstracts of these case histories, and comments upon them, appear in appendix B. Of the 73 remaining cases to be considered, 1 was in an adult female with a past history of epilepsy. During her illness she had a severe epileptic convulsion, went into shock, as judged by her blood pressure, and died several hours later. The interpretation of her case, complicated by these events, is difficult and has been excluded, but the abstract of her history appears in appendix B.

There was 1 additional case of the remaining 72 which was excluded. This patient recovered from her illness and the serum was administered during a subsequent short febrile illness presumed to be a relapse. A brief abstract of this case appears in appendix B.

There were then 71 cases which, beyond a reasonable doubt, were Rocky Mountain spotted fever. The histories of tick contacts, onset, time of appearance of the rash, and the clinical course were all compatible with this diagnosis. Positive Weil-Felix reactions and positive complement fixation tests confirmed the diagnosis in those patients from whom serums were received. These 71 patients were considered to have had an adequate amount of anti-Rocky Mountain spotted fever serum. They have been divided into two groups: those treated on or before the third day of the exanthem, a total of 52 cases; and those treated after the third day of rash, a total of 19 cases.

The data on the 19 cases given serum after the third day of rash are presented in table 1, while those for the 52 cases treated earlier are presented in table 2. It will be seen that there were two deaths in each series. These two tables have been consolidated by age into tables 1–B and 2–B. In these two tables it will be noted that among the patients treated after the third day of rash (table 1–B) there was 1 death out of 10 cases in the age group under 15, and 1 death out of five cases in the age group of 40 and over. In table 2–B, among those patients treated before the third day of rash, there were no

TABLE 1.—*Data on 19 cases of Rocky Mountain spotted fever treated with serum after the third day of rash*

Case No.	Initials of patient	Place of treatment	Name of physician	Address of physician	Age of patient	Sex of patient	Date of onset	Date of rash	Date serum given	Amount of serum (cc.)	Date temperature reached 98.6°	Outcome	Reactions
53-B	Mrs. R. B.	Hospital	R. Barber	Rawlins, Wyo.	Adult	F.	(1)	(1)	*1941* June 18	60	*1941* July 9	Recovered	None reported.
54-B	H. T. B.	Home	F. J. Carpenter	Lorton, Va.	5	M.	*1940* Aug. 13	*1940* Aug. 14	*1940* Aug. 23	20	*1940* Sept. 4	do	Do.
55-B	Mrs. W. W. B.	Doctor's Hospital, Washington, D. C.	W. C. Barr, Jr.	Annandale, Va.	28	F.	Aug. 5	Aug. 8	Aug. 16	40	Aug. 27	do	Do.
56-B	R. H.	Paul Kimball Hospital, Lakewood, N. J.	Blackwell Sawyer	Toms River, N. J.	10	M.	*1941* June 1	*1941* June 7	*1941* Aug. 15	40	*1941* June 21	do	Do.
57-B	M. H.	Crawford W. Long Memorial Hospital, Atlanta, Ga.	Fort	Atlanta, Ga.	9	F.	May 6	May 6	May 13	40	About May 30	do	Do.
58-B	L. D.	Children's Hospital, Washington, D. C.	Welsh	Rockville, Md.	4	F.	Apr. 24-25	Apr. 26	May 1	20		Died May 4, 1941	
59-B	Mrs. L. J. K.	Hospital	D. A. Gordon	Hamilton, Mont.	50	F.	July 31	Aug. 5	Aug. 13	40	Aug. 19	Recovered	Do.
60-B	Mrs. M. B.	do	H. I. Taylor	Jefferson City, Mo.	41	F.	Aug. 5	Aug. 6	Aug. 11	60	?	do	Do.
61-B	J. H. K.	St. Mary's Hospital, Jefferson City, Mo.	F. W. Gillham	do	14	M.	June 13	June 16	June 27	40	About July 11	do	Urticaria July 9, 1941.
62-B	J. F. B.	St. John's Hospital, Rapid City, S. Dak.	Kegaries	Rapid City, S. Dak.	26	M.	May 17	May 23	May 31	60	June 4	do	None.
63-B	B. L. J.	Hospital, Jefferson City, Mo.	Bruce	Jefferson City, Mo.	12	M.	*1942* May 26	*1942* June 1	*1942* June 8	20	June 14	do	Mild urticaria June 18, 1942.
64-B	Mrs. C.	Hospital, Laramie, Wyo.	Storey	Laramie, Wyo.	49	F.	July 16	July 20	July 25	60	Aug. 1	do	None reported.
65-B	G. W. C.	Hospital, Eugene, Oreg.	Tingle	Eugene, Oreg.	[illegible]	M.	July 24	July 26	Aug. 4	20	Aug. 12	do	None.
66-B	N. W.	Hospital, Greensboro, N. C.	S. F. Ravenel	Greensboro, N. C.	3	F.	Aug. 11	Aug. 15	Aug. 19	40	Aug. 29	do	Do.
67-B	Mr. B.	Hospital, Bigtimber, Mont.	F. W. Paul	Bigtimber, Mont.	Adult	M.	May 18	May 20	May 26	60	May 30	do	Do.
68-B	H. A.	Hospital, Alto, Ga.	R. H. Cox	Alto, Ga.	11	F.	May 16	May 17	May 22	40	June 5	do	Urticaria June 3, 1942.
69-B	P. A. Y.	Home	McCharles	Medicine Hat, Canada.	82	M.	June 22	June 27	July 2	60		Died July 8, 1942.	
70-B	R. R. R.	Hospital, Rawlins, Wyo.	C. W. Jeffrey	Rawlins, Wyo.	44	M.	May 12	May 14	May 25	40	May 28	Recovered	None.
71-B	J. B.	Hospital, Sheldon, Iowa	Balkema	Sheldon, Iowa	11	F.	June 22	June 26	July 4	60	Not known	do	None reported.

[1] Temperature of 105.4° on admission to hospital June 13, 1941.

TABLE 2.—*Data on 52 cases of Rocky Mountain spotted fever treated with serum on or before the third day of rash*

Case No.	Initials of patient	Place of treatment	Name of physician	Address of physician	Age of patient	Sex of patient	Date of onset	Date of rash	Date serum given	Amount of serum (cc.)	Date temperature first reached 98.6°	Outcome	Reactions
							1941	*1941*	*1941*		*1941*		
1	A. L. W.	Sydenham Hospital, Baltimore, Md.	H. L. Hodes	Baltimore, Md.	4	F.	June 11	June 12	June 12	40	June 22	Recovered	Urticaria, 6th day.
2	B. S.	Johns Hopkins Hospital, Baltimore, Md.	Max Michael	do	29	F.	July 30	Aug. 3	Aug. 4	60	Aug. 9	do	None reported.
3	D. B.	Franklin Square Hospital, Baltimore, Md.	J. Gluck	do	10	M.	July 28	July 31	Aug. 2	40	Sometime after Aug. 8	do	None known, patient removed from hospital on Aug. 8, 1941, for financial reasons.
4	C. H.	University Hospital, Baltimore, Md.	D. Fisher	La Plata, Md.	10	M.	June 3	June 6	June 9	40	About June 19	do	None reported.
5	A. M.	Union Hospital	H. A. Cantwell	North East, Md.	66	M.	July 21	July 22	July 24	60	Died July 23	Died	
6	M. M.	Home	R. E. Feagans	Fairfax, Va.	5	F.	June 17	June 19	June 20	40	June 27	Recovered	Urticaria on June 29, 1941, with 2 days elev. temp.
7	W. T. S.	Hospital ?	A. R. Bush	Hawkinsville, Ga.	46	F.	July 1	July 6	July 9	40	Not known	do	None reported.
8	D. S.	Home	L. F. Hobbs	Alexandria, Va.	18	F.	Aug. 20	Aug. 23	Aug. 25	40	do	do	Do.
9	M. S.	Garfield Memorial Hospital, Washington, D. C.	Wm. C. Gwynn	Washington, D. C.	33	F.	June 16	June 18	June 20	60	July 5	do	Urticaria of 1 day—July 4, 1941.
10	D. K.	Johns Hopkins Hospital, Baltimore, Md.	E. Walker	Baltimore, Md.	6	F.	May 28	May 31	May 31	40	June 18	do	None reported.
11	N. S.	St. Patrick Hospital, Missoula, Mont.	Alderson	Missoula, Mont.	25	M.	July 14	?	July 21	50	July 30	do	Do.
12	L. P.	Home	H. Freedenberg	Washington, D. C.	6	F.	July 29	July 31	Aug. 2	40	Aug. 20	do	Do.
13	R. McN.	Missoula, Mont.	C. Thornton	Missoula, Mont.	6	M.	May 11	May 12	May 13	20	May 27	do	Do.
14	C. B.	do	Wirth	do	2	M.	May 17	May 20	May 23	20	?	do	Do.
15	D. C.	Easton Hospital, Easton, Md.	Cox	Easton, Md.	9	M.	May 1	May 5	May 6	40	May 26	do	Do.
16	C. A. B.	St. Patrick Hospital, Missoula, Mont.	Alderson	Missoula, Mont.	5	F.	Mar. 8	Mar. 11	Mar. 11	20	Mar. 26	do	Do.
17	D. P. P.	Memorial Hospital, Lynchburg, Va.	E. G. Scott	Lynchburg, Va.	63	M.	Apr. 22	Apr. 25	Apr. 28	40	May 22	do	Do.
18	Mrs. K.	Home	H. A. Latane	Alexandria, Va.	45	F.	July 7	July 10	July 11	40	July 20	do	Do.
19	T. M.	County Hospital, Missoula, Mont.	J. M. Nelson	Missoula, Mont.	52	M.	Apr. 23	Apr. 26	Apr. 26	60	May 13	do	Do.

20	E. S.	Home	E. H. Wilson	Tracys Landing, Md.	45	M.	May 8	May 10	May 12	60			Do.
21	A. K.	University Hospital, Baltimore, Md.	Callahan	Baltimore, Md.	21	M.	June 16	June 21	June 24	60	July 1	do	Do.
22	Mrs. R. H.	do	T. N. Carey	do	36	F.	June 28	July 1	July 2	60	July 16	do	Do.
23	Mrs. R. H.	do	do	do	65	F.	July 31	Aug. 2	Aug. 5	60	Aug. 19	do	Do.
24	Mrs. H.	Barrett Hospital, Dillon, Mont.	Routledge	Dillon, Mont.	51	F.	June 11	June 19	June 22	60	July 6	do	Do.
25	Mrs. P. H.	Home, Pilot Rock, Oreg.	Smith	Pilot Rock, Oreg	71	F.	June 26	June 30	July 2	60	July 6 up again on July 11–18.	do	Urticaria uly 15–16, 194
26	C. F. B	Home, Havre De Grace, Md.	Foley	Havre De Grace, Md.	23	M.	Aug. 13	Aug. 18	Aug. 19	60	Sept. 2	do	None rej rted.
27	F. L.	Children's Hospital, Washington, D. C.	Hugh Davis	Washington, D.C.	11	M	July 11	July 13	July 14	40	approx. Aug. 1	do	Do.
28	H. R.	University Hospital, Baltimore, Md.	T. N. Carey	Baltimore, Md.	6	M	June 1	June 6	June 9	40	June 20 1942	do	Do.
29	R. D.	Home	S. H. Williams	Alexandria, Va.	11	M.	Sept. 17	Sept. 20	Sept. 22	40	Sept. 30	do	Do.
30	Not known	do	Brother, Indiana State Health Dept	Indianapolis, Ind.	27	M	July 17	July 21	July 22	40	Aug. 3	do	Do.
31	do	do	do	do	24	F.	July 16	July 21	July 22	40	Aug. 3	do	Do.
32	J. D.	Dr. W. H. Groves, Latter-Day Saints Hospital, Salt Lake City, Utah.	D. K. Allen	Salt Lake City, Utah.	46	M.	June 6	June 8	June 8	60	June 24	do	Do.
33	P. A.	Hospital, Winchester, Va.	T. A. Gibson	Winchester, Va.	4	F.	June 1	June 3	June 3	40	June 11	do	Urticaria June 10, 1942.
34	J. M.	University Hospital, Baltimore, Md.	W. H. Townshed, Jr.	Baltimore, Md.	13	F.	July 11	July 13	July 15	60	July 27	do	Urticaria July 25, 1942.
35	W. S. H.	Home	J. T. Jackson	Leesburg, Va.	4	M	July 25	July 28	July 30	40	Aug. 19	do	None reported.
36	F. P.	Sydenham Hospital, Baltimore, Md.	Hodes	Baltimore, Md.	3	F.	June 16	June 18	June 19	20	June 28	do	Do.
37	J. C.	Home	S. W. Hausman	Red Bank, N. J.	6	F.	May 20	May 22	May 24	40	July 2	do	Urticaria May 29, 1942.
38	J. D.	Hospital, Nassawadox, Va.	Lt. Croskery, MC, U. S. A.	Accomac, Va.	24	M.	June 3	June 7	June 9	60	June 26	do	None reported.
39	J. M.	Frederick City Hospital	A. A. Pearre	Frederick, Md.		M.	July 6	July 11	July 14	60	Died July 21, 1942 of complicating bronchopneumonia.	Died	
40	D. J.	do	do	do	4	M.	July 4	about July 7	July 8	20	July 18	Recovered	Do.
41	F. F.	Cape Cod Hospital, Hyannis, Mass	H. F. Rowley	Hyannis, Mass.	17	M.	June 27	July 2	July 4	60	about July 10	do	Urticaria about July 12

TABLE 2.—*Data on 52 cases of Rocky Mountain spotted fever treated with serum on or before the third day of rash*—Continued

Case No.	Initials of patient	Place of treatment	Name of physician	Address of physician	Age of patient	Sex of patient	Date of onset	Date of rash	Date serum given	Amount of serum (cc.)	Date temperature first reached 98.6°	Outcome	Reactions
							1942	*1942*	*1942*		*1942*		
42	J. S.	Georgetown University Hospital, Washington, D. C.	E. N. Ashenbach	Washington, D.C.	9	M.	July 7	July 10	July 13	40	July 23	Recovered	None.
43	W. S.	Home	M. A. Sheppard	Elmer, N. J.	4	M.	July 2	July 5	July 7	20	July 22	do	Do.
44	F. B.	Hospital, High Point, N.C.	C. F. Ridge	High Point, N. C.	62	M.	about Aug. 9	Aug. 11	Aug. 14	60	Aug. 18	do	Do.
45	D. D.	Children's Hospital, Cincinnati, Ohio.	A. Diamond	Cincinnati, Ohio.	6	F.	Aug. 1	Aug. 2	Aug. 4	20	Aug. 14	do	Do.
46	J. B. K.	University Hospital, Baltimore, Md.	A. F. Lavenstein	Baltimore, Md.	3	F.	June 25	June 27	June 30	20	July 6	do	Do.
47	R. C. W.	do	do	do	5	M.	June 27	June 28	July 1	30	July 7	do	Chill and rise in temperature to 103° fol. 10 cc. dose.
48	W. A.	District Training School Hospital, Laurel, Md.	Dugan	Washington, D.C.	28	M.	July 3	July 5	July 8	60	July 13	do	None.
49	W. S.	University Hospital, Baltimore, Md.	MacCubbin	Baltimore, Md.	28	Colored M.	about July 12	July 19	July 22	60	Aug. 8	do	Do.
50	R. B.	Children's Hospital, Washington, D. C.	McLendon	Washington, D.C.	6	M.	June 7	June 9	June 12	40	June 24	do	Do.
51	F. B.	do	Broochs	do	15 mo.	F.	July 8	July 10	July 11	20	July 28	do	Urticaria July 23, 1942.
52	D. D.	Home, Indianola, Iowa	E. E. Shaw	Indianola, Iowa	38	M.	Aug. 1	Aug. 4	Aug. 4	160	Aug. 23	do	None reported.

TABLE 1-B.—*19 cases of Rocky Mountain spotted fever treated with serum after the third day of rash*

Year	Age (years)					
	Under 15		15-39		40 and over	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
1941	5	1	3	0	2	0
1942	5	0	1	0	3	1
Total	10	1	4	0	5	1

TABLE 2-B.—*52 cases of Rocky Mountain spotted fever treated with serum on or before the third day of rash*

Year	Age (years)					
	Under 15		15-39		40 and over	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
1941	10	0	7	0	9	1
1942	16	0	7	0	3	1
Total	26	0	14	0	12	2

deaths in the group of 26 cases in the age group under 15, nor in the 14 cases in the age group 15-39. In the age group of 40 and over 2 deaths occurred; one patient was 66, and the other was 72 years of age.

Since it is practically impossible to have an untreated group serving as controls in this disease, which is so sporadic, it will be necessary to compare these observed fatalities with the expected fatalities as reported for Rocky Mountain spotted fever. Statistics were collected from two eastern States (Maryland and Virginia) and from two western States (Montana and Idaho) for a 10-year period some time ago *(10)*. These figures will serve as a basis for comparison and are presented in table 3. It will be noted from this table that there is no significant difference in fatality rates between the two eastern States and the two western States provided the ages are taken into account. There is a considerable difference in fatality rates between various age groups. It will also be noted that for the age group under 15 there is roughly a fatality of 12.5 percent, for age group 15–39 a fatality rate of 13 percent, and for the group over 40 years a fatality rate of about 40 percent. The totals from table 2–B have been placed in table 2–C as the observed and are compared with expected fatalities from table 3. It will be noted that for all age groupings the observed number of deaths was less than the expected and the fatality rates are correspondingly lower. A similar table (table

1–C) has been prepared for the 19 cases treated after the third day of rash. There is little if any difference in table 1–C between the observed and the expected fatalities.

TABLE 3.—*Rocky Mountain spotted fever. Cases occurring in certain western and eastern States, by age and fatality rate*

State	Number of cases	Number of deaths	Fatality rate	Under 15 years				15–39 years				40 and over			
				Cases	Percent of total	Deaths	Fatality rate	Cases	Percent of total	Deaths	Fatality rate	Cases	Percent of total	Deaths	Fatality rate
West:															
Idaho	293	101	34.4	27	9.2	7	25.9	108	36.8	22	20.3	158	53.9	72	45.5
Montana	454	109	24.0	81	17.8	6	7.4	156	34.3	18	11.5	217	47.8	85	39.1
Total	747	210	28 1	108	14.4	13	12.0	264	35.3	40	15.1	375	50 2	157	41.8
East:															
Maryland	330	66	20.0	155	46.9	19	12.2	85	25.7	13	15 2	90	27.2	34	37.7
Virginia	331	56	16.9	155	46.8	21	13.5	104	31 4	8	7 6	72	21.7	27	37.5
Total	661	122	18.4	310	46.8	40	12.9	189	28 5	21	11 1	162	24.5	61	37 6

NOTE: All cases and deaths as reported to the State Health Officer, Montana, Idaho, and Maryland, 1930–39, inclusive;. Virginia, 1933–39, inclusive.

TABLE 1–C.—*The observed and expected fatalities in the 19 cases treated after third day of rash*

	Age (years)								
	Under 15			15–39			40 and over		
	Cases	Deaths	Fatality rate (percent)	Cases	Deaths	Fatality rate (percent)	Cases	Deaths	Fatality rate (percent)
Observed (from table 1–B)	10	1	10	4	0	0	5	1	20
Expected (from table 3)	10	1.25	12.5	4	0.5	13	5	2	40

The differences noted in table 2–C of the 52 cases treated fairly early in the course of their illness, while not great when considered from a statistical viewpoint, are within the range that is ordinarily considered significant. A reduction in fatality for a group of 52 cases from an expected of 9.8, or 18.8 percent, to an observed of 2, or 3.8 percent, would occur approximately once in one hundred times by chance alone.

It will also be noted from the data presented for the 71 cases that the only untoward reaction noted from serum administration was urticaria some 7 days later. There were no sharp elevations of temperature or pulse rates, and no severe chills following its administration. The urticarial reaction was noted in 12 of the 71 cases, or 14 percent of the total. (This is about the expected incidence following this type of serum therapy.)

In the analysis of these 71 cases no attempt has been made to utilize duration of fever, amelioration of symptoms, or any other measure except case fatality rates. Other factors are so variable and so susceptible to individual interpretation that they have been disregarded.

TABLE 2-C.—*The observed and expected fatalities in the 52 cases treated on or before the third day of rash*

	Age (years)											
	Under 15			15-39			40 and over			Total, all ages		
	Cases	Deaths	Fatality rate (percent)	Cases	Deaths	Fatality rate (percent)	Cases	Deaths	Fatality rate (percent)	Cases	Deaths	Fatality rate (percent)
Observed (from table 2-B)	26	0	0	14	0	0	12	2	16 6	52	2	3.8
Expected (from table 3)	26	3.2	12 5	14	1.8	13	12	4.8	40	52	9.8	18.8

SUMMARY AND CONCLUSIONS

From the animal experiments it would seem that it is entirely possible to produce an immune serum in rabbits by the use of live virus, either from infected ticks or infected yolk sacs, as the antigen, since experimentally the "L" serum acted in a comparable manner to the "T" serum.

The administration of this serum to infected guinea pigs and monkeys demonstrated its therapeutic value when given early. With small doses it was found, experimentally, that the therapeutic effect varied inversely with elapsed time from the inoculation of the infecting dose to the administration of the serum. If given within 24 hours after infection, it would completely suppress the disease. If a small dose were given either 48 to 72 hours following the infection, it would modify the disease in such a manner as to prevent death as well as the scrotal reaction of spotted fever in guinea pigs. This small dose was of no value after 72 hours, but if the dose was increased benefit could be demonstrated as late as 120 hours after infection (the second day of fever.)

The results of the human trial are not conclusive, mainly because of the relatively small number of the cases in the series. Data have been presented which indicate that the observed fatality rate in those cases treated before the third day of rash was considerably below that expected from past experience with patients receiving no serum. Of the 52 cases treated in this group there were only two deaths, both in males 66 and 72 years of age, respectively, or a fatality rate of 3.8 percent as compared to the expected rate of approximately 18.8 percent.

520064°—43——3

It is therefore thought that anti-Rocky Mountain spotted fever serum should be considered as offering hope in the treatment of this disease, particularly if administered early in its course. A definite opinion as to its true value should, however, be withheld until additional observations have been reported.

ACKNOWLEDGEMENTS

It is desired to express appreciation to Dr. R. W. G. Wyckoff and the Lederle Laboratories for the preparation and supply of the "L" serum used in these studies and to the many physicians whose cooperation made the human trials possible. It is also desired to acknowledge gratefully the advice and assistance furnished by Dr. R. R. Parker, Director, Rocky Mountain Laboratory, Hamilton, Mont.

REFERENCES

(*1*) Ricketts, H. T., and Gomez, L.: Studies on immunity in Rocky Mountain spotted fever. J. Infect. Dis., **5**: 221–244 (1908).
(*2*) Heinemann, P. G., and Moore, J. J.: The production and concentration of a serum for Rocky Mountain spotted fever. Preliminary note. J. Am. Med. Assoc., **57**: 198 (1911).
(*3*) Heinemann, P. G., and Moore, J. J.: Experimental therapy of Rocky Mountain spotted fever. J. Infect. Dis., **10**: 294–304 (1912).
(*4*) Noguchi, H.: Immunity studies of Rocky Mountain spotted fever. I. Usefulness of immune serum in suppressing an impending infection. II. Prophylactic inoculation in animals. J. Exp. Med., **37**: 383 and **38**: 605 (1923).
(*5*) Topping, Norman H.: Rocky Mountain spotted fever. Treatment of infected laboratory animals with immune rabbit serum. Pub. Health Rep., **55**: 41 (1940).
(*6*) Kurotchkin, T. J., Van der Scheer, J., and Wyckoff, R. W. G.: Refined hyperimmune Rickettsia sera. Proc. Soc. Exp. Biol. and Med., **45**: 323 (1940).
(*7*) Topping, Norman H.: Experimental Rocky Mountain spotted fever and endemic typhus treated with prontosil or sulfapyradine. Pub. Health Rep., **54**: 1143 (1939).
(*8*) Steinhaus, E. A., and Parker, R. R.: Experimental Rocky Mountain spotted fever: Results of treatment with certain drugs. Pub. Health Rep., **58**: 351 (1943).
(*9*) Martin, David W.: Rocky Mountain spotted fever in children. J. Pediat., **16**: 468 (1940).
(*10*) Topping, Norman H.: Rocky Mountain spotted fever. A note on some aspects of its epidemiology. Pub. Health. Rep., **56**:1699 (1941).

Appendix A

A–1.—P. C. V., a 21-year-old Maryland female. Removed tick from heel on August 13, 1942. Local area of infection about site of tick attachment August 18. Local treatment to spreading area August 19. Fever of 100°–103° on August 21–August 22 and August 23. A weeping rash on lower part of both legs noted August 22. Reported as Rocky Mountain spotted fever on August 23 and given serum. Weeping rash on both legs receding on August 24. Normal temperature on August 25, 1942, and thereafter.

Impression: Not at all suggestive of Rocky Mountain spotted fever.

A–2.—L. R., a 37-year-old Missouri male. Removed a tick from left groin on May 16, 1942, with a pocket knife. Patient noticed swelling of left inguinal glands and marked tenderness over area. Chills, fever, and pain in left groin began on May 21. Anti-Rocky Mountain spotted fever serum give on May 24 although

there was no suggestion of a rash. Patient developed an undescribed exanthem on May 30, 6 days after serum therapy. Developed signs of pulmonary consolidation June 4—died June 6, 1942—at which time all serological tests reported as negative.

Impressions: Not typical of Rocky Mountain spotted fever as there was no rash until 14 days from onset which was 6 days after serum therapy. Case may have been one of septicemia from local infection in left groin, or even perhaps tularemia.

A-3.—B. S., a 22-year-old New Jersey male. Onset September 6, 1942, with headache. Generalized rash (except face), chills, fever 103° on September 7. Given anti-Rocky Mountain spotted fever serum on September 8. Rash disappeared and temperature fell to normal on September 9, 1942. Patient remained well thereafter.

Impression: Not Rocky Mountain spotted fever.

A-4.—E. P., a 21-year-old pregnant New Jersey female. Onset June 29, 1942, with nausea, weakness, drowsiness, chills, temperature 103°, and abdominal pain. Operation June 29 for appendicitis. Appendix removed—pregnancy not disturbed. Pathological report on appendix was "no definite pathology." On June 30 patient developed chill, fever 104°, and generalized rash. Given anti-Rocky Mountain spotted fever serum on July 1. Temperature fell by crisis 2 days later and rash began to disappear. Patient made an uneventful recovery. All agglutination tests reported as negative.

Impression: Not Rocky Mountain spotted fever.

A-5.—H. N., a 27-year-old Virginia male. Onset May 25, 1941. "When he became sick with a rash, which was first noticed on his face, then later on extremities and trunk." Admitted to hospital June 2—patient could not be aroused, temperature 103°, widespread, fine, macular, purplish rash. There was rigidity of the neck and extremities. Grasping reflex of hands and positive Kernig present.

Laboratory data: W. B. C. 17,500 $\bar{c}$ 83 percent p. m. n.'s. Spinal fluid—570 white cells 63 percent p. m. n.'s. Smear and culture negative. Agglutination tests negative. Blood culture negative.

Course: Given anti-Rocky Mountain spotted fever serum on approximately the eleventh day of rash. Finally given intravenous sulfapyridine. Patient died on June 11, 1941.

Impression: Probably not Rocky Mountain spotted fever. The early appearance of the rash, its description, the evident brain involvement, the 570 cells in the spinal fluid, point perhaps to an infection with the meningococcus.

A-6.—L. L., a 34-year-old Virginia female. Onset January 22, 1943, with headache, sore throat, chills; January 23—temperature 103°–104.6°. Irrational at intervals. Rash appeared on legs between knees and ankles January 24 and later in the day on forearms. Rash on soles and palms January 25—on rest of body January 26. Anti-Rocky Mountain spotted fever serum given on January 26. Temperature returned to normal on January 29 and remained so thereafter. Three separate samples of serum have been tested at the National Institute of Health both by the Weil-Felix and complement fixation tests and all have been negative. The State epidemiologist investigated the case and could obtain no history of tick or other arthropod contacts. Approximately 10 days prior to onset six of seven cats had died on the farm.

Impression: Not Rocky Mountain spotted fever because of lack of tick contact, did not occur during the proper season, and could not be confirmed by laboratory serological tests.

A-7.—F. N., a 26-year-old Missouri female. Patient gave no history of tick contact. Came into hospital with a history of having been ill for 1 week. A universal macular rash present on admission, temperature 102°. Given anti-Rocky Mountain spotted fever serum—rash disappeared and temperature de-

clined to 99° in about 48 hours. She was temperature free and showed only slight ecchymosis in region of both breasts for 6 days. A hemorrhagic rash then appeared over entire body, she had marked generalized edema, and bled from the alimentary tract, genitourinary tract, and from the nose and mouth. Markedly disoriented for about 10 days, gradually recovered after transfusion therapy.

Impression: Not Rocky Mountain spotted fever.

Appendix B

Abstracts of records of four cases treated with inadequate dosage of anti-Rocky Mountain spotted fever serum

B–1.—J. B., a 68-year-old Utah male. Onset June 20, 1942; first seen by physician on June 25; temperature 102°, beginning delirium, and petechial rash about wrists and ankles. Had been in sheep camp on Utah-Idaho line. Ten cubic centimeters (all that was available) of anti-Rocky Mountain spotted fever serum given on June 28. Patient died June 29, 1942.

B–2.—J. A., a 60-year-old Montana male. Onset July 3, 1941, with headache and dizziness; fell while having breakfast, temperature 103.8°. Had been on a fishing trip in Montana and removed tick from left axilla on or about June 30, 1941. Removed to hospital where slurring of speech was noted. There was a pulse deficit of about 20/min at the wrist, and the blood pressure was irregular. July 4—temperature down in morning, high in evening. Patient was irrational and required restraint in bed. July 5—in the morning a punctate rather dull colored petechial rash appeared over both ankles. By afternoon there was a similar eruption over back. Patient now partially incontinent. Forty cc. of anti-Rocky Mountain spotted fever serum administered at about midnight into the gluteal muscle. Patient became progressively worse and died before the remainder of the calculated dose of serum could be administered the next morning. The physician notes that the patient died of circulatory failure.

Discussion: This case excluded from analysis as patient obviously in extremis at time of treatment. Doubtful if much if any absorption of intramuscularly administered serum.

B–3 and *B–4.*—Two cases, age unknown, in a small town in Wyoming. Sufficient serum was obtained to treat one case but this was divided between these two cases. One of these cases died on approximately the tenth day of illness, the other on the thirteenth. Date of appearance of rash and of serum administration not known.

A note from Dr. N. H. Savage, Director of Division of Epidemiology, State of Wyoming Department of Public Health, to Dr. R. R. Parker states, "On a recent visit to ———, I learned that it (antiserum) had been used on three patients there. One patient was given the recommended dosage and recovered completely, although desperately ill at the time of treatment, The other two cases were each given one-half the recommended dose and both died. I think these facts should be borne in mind in evaluating the results of treatment."

Abstract of record of one case treated during presumed relapse

B–5.—Mrs. G. B., adult white Montana female. Onset April 17, 1942, with severe chills, fever, and general malaise some 4 days after having removed a tick from her body.

Course: Temperature 101.5° on April 17—dropped to normal on April 18 and April 19. Went to 100° on the 20th, then to 103° on the 21st. She developed a macular rash, and anti-Rocky Mountain spotted fever serum was administered on April 22. Temperature only 100° on April 23, and normal on April 24; to remain so thereafter.

Discussion: Much too mild an illness to be Rocky Mountain spotted fever. No confirmation, as serum sample could not be obtained.

Abstract of record of case of Rocky Mountain spotted fever complicated by epilepsy

B–6.—E. W., a 40-year-old Montana female with a past history of epilepsy. Removed a tick from right axilla on April 5, 1941. Onset on April 8. Rash not observed until April 13 but may have been present at least 1 day previously (note from Dr. R. R. Parker). Forty cubic centimeters of anti-Rocky Mountain spotted fever serum given on April 14. Patient had no untoward reaction and apparently was improved. On April 15 patient had a severe epileptic convulsion—blood pressure fell to 50/35, pulse became weak and thready. Patient never became rational again, blood pressure remained low, and patient died in about 8 hours.

AN IMPROVED ANTIGEN FOR COMPLEMENT FIXATION IN AMERICAN TRYPANOSOMIASIS [1]

By Dorland J. Davis, *Passed Assistant Surgeon, United States Public Health Service*

Although the complement fixation test has been used frequently in the diagnosis of American trypanosomiasis (Chagas' disease), difficulties have been encountered in the preparation of a satisfactory antigen. In 1936 Kelser (*1*) reported a successful antigen made from cultures of *Trypanosoma cruzi* grown on artificial media. This antigen was preserved in glycerine and remained usable for 1 month. Romano and Dias (*2*) recently have used an alcoholic extract of cultured trypanosomes. The purpose of this paper is to report the simple preparation of an antigen that retains its potency for many months.

Cultures of *T. cruzi* are grown on a medium similar to the one used by Kelser. A blood agar base is made of the following composition: Beef or horse meat infusion, 2 percent proteose peptone No. 3 (Difco), 0.7 percent sodium chloride, 0.5 percent dextrose, 2 percent agar, and 10 percent defibrinated rabbit blood. The pH is adjusted to 7.6, and the sterile dextrose solution and blood added just before tubing. About 25 cc. of this media is slanted in large tubes, 25 mm. × 200 mm. in size. After the slant has solidified, it is covered with about 25 cc. of infusion broth containing 2 percent proteose peptone No. 3 and 0.5 percent dextrose. The tubes are inoculated with 0.5 cc. to 1 cc. of an actively growing culture of *T. cruzi* and incubated at 25° to 28° C. for 10 days.

It has been our experience that strains recently isolated from animals or from other media require several transfers in smaller amounts of media before attaining the maximum cultural activity.

The broth containing the organisms should be drawn off carefully and centrifuged rapidly to pack the trypanosomes which then are

[1] From the Division of Infectious Diseases, National Institute of Health. Part of this work was done at the Bureau of Laboratories, Texas State Department of Health, Austin, Tex.

washed three times with normal saline by rapid centrifugation, preferably at 4° C. Finally the material is washed and centrifuged in a 15 cc. graduated centrifuge tube using saline containing merthiolate (1:10,000). The volume of packed material is measured, the washing solution poured off, and nine volumes of saline with merthiolate (1:10,000) added. The amount of packed material varies, but at least 0.5 cc. should be obtained from the growth in 20 large tubes.

This suspension is frozen in dry ice and methyl cellosolve, and allowed to thaw slowly. The freezing and thawing is repeated three times. The material is ready for titration and after shaking is a grayish white, fine, homogenous suspension. On standing, the suspension will settle and should be shaken thoroughly before use. The stock antigen is kept tightly stoppered at 4° to 6° C.

This antigen was titrated with a 1:10 dilution of serums from infected guinea pigs or from rabbits injected intravenously with the antigen. The undiluted stock antigen was frequently anticomplementary but was rarely so in dilutions of 1:10 or greater. None tested so far has been hemolytic. A good antigen will fix complement when diluted 1:60 or 1:80. In our experience this is about three times as potent as unfrozen antigen in glycerine. In order to attain the highest sensitivity for testing serums, the dilution of stock antigen should be about twice the lowest dilution that is not anticomplementary.

The Kolmer technique for complement fixation (*3*) using serial dilutions of serums and the quantitative technique as used by Bengtson (*4*) have been followed successfully in testing the serums of infected animals and humans. Using an antigen made from a human strain of *T. cruzi*, fixation has been obtained with infected guinea pig serums in dilutions of 1:40 or greater. The serums of 10 monkeys showed no fixation in any dilution before the animals were infected with *T. cruzi*, but 4 to 6 weeks later fixation occurred in a 1:80 dilution or higher of the serums from 8 monkeys, and in a 1:40 and 1:10 dilution in the other two serums, respectively.

Samples of serum [2] from nine human cases of American trypanosomiasis have been tested with this antigen. One was positive in a 1:160 dilution, three in 1:40, three in 1:20, and two, not tested in higher dilutions, were positive in a 1:10 dilution. Known normal human serums have been consistently negative. Of six serums from convalescent malaria patients, one was positive in a 1:20 dilution and the others were negative. Sixteen syphilitic serums were negative in dilutions of 1:10.

[2] These samples were furnished by Dr. Salvador Mazza, University of Buenos Aires, Jujuy, Argentina; Dr. Emmanuel Dias, Instituto Oswaldo Cruz, Rio de Janeiro, Brazil; and Dr. Felix Pifano, Instituto Nacional de Higiene, Caracas, Venezuela, to whom the author wishes to express his indebtedness.

This antigen has proved to be very stable. Of seven lots tested, all retained their original potency 6 months after being made, and of two tested a year after preparation, both remained potent although the titre had diminished. Two portions of one lot kept for 1 month at room temperature and in a 37° C. water bath, respectively, exhibited only a slight reduction in titre.

SUMMARY

A stable antigen, easily prepared by freezing and thawing the cultural forms of *Trypanosoma cruzi* in saline with merthiolate (1:10,000) has fixed complement satisfactorily in the presence of serums from human beings and animals infected with this trypanosome.

REFERENCES

(*1*) Kelser, R. A.: A complement-fixation test for Chagas' disease employing an artificial culture antigen. Am. J. Trop. Med., **16**: 405–415 (1936).
(*2*) Romano, C., and Dias, E.: Reacao de fixacao do complemento na Doenca de Chagas, com antigeno alcoolico de cultura do "Schizotrypanum cruzi." Memorias do Instituto Oswaldo Cruz, **37**: fasc. 1, 1–10 (1942).
(*3*) Kolmer, J. A.: The Kolmer complement fixation test for syphilis. Supplement No. 11 to Venereal Disease Information. Technics of serodiagnostic tests for syphilis, pp. 56–72. Govt. Print. Office, Washington D. C. (1940).
(*4*) Bengtson, Ida A.: Complement fixation in endemic typhus fever. Pub. Health Rep., **56**: 649–653 (1941).

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

March 28–April 24, 1943

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the Public Health Reports under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4-week period ended April 24, 1943, the number reported for the corresponding period in 1942, and the median number for the years 1938–42.

DISEASES ABOVE MEDIAN PREVALENCE

Meningococcus meningitis.—The number of cases of meningococcus meningitis rose from 2,272 for the preceding 4-week period to 2,389 for the 4 weeks ended April 24. The current incidence was the highest on record for any 4-week period, the nearest approach to it being in 1929 when 1,289 cases were reported for the period corresponding to the one under consideration. The years 1939, 1940, and 1941, within which period the 5-year median falls (1941), were years of low men-

ingitis incidence, and probably a more significant comparison is with the average (839 cases) for the years 1935–37, the current incidence being about 2.8 times that figure.

The table shows, by geographic areas, the number of cases reported for recent weeks in comparison with the experience of the 2 preceding years and also that of the peak year of 1929. All regions of the country have contributed to the sharp rise of this disease that became apparent the latter part of 1942, but the largest excesses over the normal seasonal expectancy have been reported from the Atlantic Coast,

Meningococcus cases reported by weeks during 1943 with comparative data for the corresponding period in 1942, 1941, and 1929 [1]

Division	Week ended—1943													
	Jan. 30	Feb. 6	Feb. 13	Feb 20	Feb. 27	Mar. 6	Mar. 13	Mar. 20	Mar. 27	Apr. 3	Apr. 10	Apr. 17	Apr 24	May 1
All regions:														
1943	339	330	446	398	503	556	525	619	572	595	606	619	549	591
1942	65	60	42	84	87	70	88	91	90	111	112	88	79	80
1941	53	48	46	46	44	56	43	53	54	70	48	53	62	33
1929 [2]	268	226	256	196	303	297	332	325	330	326	338	295	276	283
New England:														
1943	50	42	49	60	52	61	56	76	88	59	79	72	64	64
1942	6	5	5	5	14	17	10	12	11	13	13	7	12	13
1941	3	1	3	3	3	2	3	4	4	4	5	1	2	2
1929	7	7	8	2	6	11	9	7	6	11	9	5	12	5
Middle Atlantic.														
1943	57	67	94	92	108	117	104	125	133	145	115	135	128	159
1942	19	17	10	18	16	14	19	29	31	40	38	29	25	25
1941	9	7	13	13	8	11	7	9	15	14	13	10	14	9
1929	66	55	58	51	61	54	68	55	27	79	55	48	42	52
East North Central:														
1943	39	38	26	46	41	44	58	40	57	67	51	68	86	96
1942	4	5	5	3	7	4	9	7	5	5	8	4	8	3
1941	3	5	4	4	2	8	8	7	4	7	2	12	4	5
1929	51	43	49	48	63	78	89	65	123	115	122	101	102	105
West North Central:														
1943	24	27	19	22	34	43	25	38	31	22	38	55	27	39
1942	2	3	3	1	4	2	2	2	2	3	3	8	2	2
1941	0	6	3	3	1	5	2	4	1	2	2	3	3	2
1929	24	32	40	33	46	49	42	63	30	29	34	40	29	31
South Atlantic:														
1943	68	71	116	72	[3]104	[4]105	105	159	95	106	119	131	85	103
1942	19	13	7	17	20	14	21	19	20	22	20	21	13	17
1941	19	5	7	7	17	10	8	8	13	21	10	12	18	9
1929	17	6	6	7	7	6	15	13	5	10	5	7	8	7
East South Central:														
1943	22	16	35	13	64	45	54	74	53	90	52	44	62	38
1942	7	7	3	3	10	3	6	5	8	6	8	9	12	10
1941	10	14	12	12	8	9	7	8	11	11	11	8	10	5
1929	8	7	6	5	5	2	8	12	6	6	5	14	3	4
West South Central:														
1943	21	16	31	18	29	27	45	48	46	29	66	[6]35	13	25
1942	3	7	4	31	10	8	15	11	4	8	11	8	1	6
1941	8	7	2	2	1	8	4	5	4	7	3	2	7	0
1929	35	20	16	10	15	13	18	15	13	18	31	11	13	11
Mountain:														
1943	10	7	17	11	18	[5]25	20	12	8	6	30	18	25	16
1942	1	2	1	2	3	1	1	1	0	1	3	0	1	0
1941	0	0	1	1	2	0	2	2	0	2	1	0	1	0
1929 [2]	38	35	54	25	61	54	56	41	50	34	33	28	35	32
Pacific														
1943	48	46	59	64	53	89	58	47	61	71	56	61	59	51
1942	4	1	4	4	3	7	5	5	9	13	8	2	5	4
1941	1	3	1	1	2	3	2	6	2	2	1	5	3	1
1929	22	21	24	15	39	30	27	54	70	24	44	41	32	36

[1] Similar tables appeared in Public Health Reports for Mar. 19, 1943, p. 494, and Apr. 16, 1943, p 648
[2] Exclusive of Nevada.
[3] Delayed report of 19 cases in Virginia included.
[4] Delayed report of [illegible] cases in Virginia included.
[5] Delayed report of 10 cases in Arizona included.
[6] Delayed report of 15 cases in Arkansas included.

Mountain, and Pacific regions. In the New England region the number of cases (274) (reported for the 4 weeks ended April 24) was almost 20 times the 1938–42 median, while in the Pacific region the number (247) was more than 22 times the median. The numbers of cases have fluctuated considerably during recent weeks; the numbers reported for the country as a whole were 619 for the week ended April 17, 569 for the week ended April 24, and 591 for the week ended May 1.

For the country as a whole the current incidence has been higher each week of 1943 than it was in 1929. A comparison of geographic regions, however, shows that the disease has been most prevalent in regions along the Atlantic coast, with minor excesses over the 1929 figures in the South Central and Pacific regions; whereas in 1929 the highest incidence occurred in the North Central and Mountain regions.

States in which the disease was unusually prevalent during the current period were New York 261, Pennsylvania 149, New Jersey 113, Massachusetts 128, Michigan 87, Illinois 73, Missouri 95, Maryland 76, Virginia 111, North Carolina 79, South Carolina 69, Kentucky 72, Mississippi 78, California 182, and Idaho 31.

Measles.—For the 4 weeks ended April 24 there were approximately 104,000 cases of measles reported—an increase of about 17,000 cases over the preceding 4-week period. For the country as a whole and for each geographic area except the South Atlantic the current incidence was considerably above the 1938–42 median. The largest numbers of cases were reported from the North Atlantic and North Central regions. In the Middle Atlantic, East North Central, and East South Central regions the numbers of cases were more than 2.5 times the median and in other regions the incidence ranged from 1.2 times the median in the Pacific region to 1.9 times the median in the New England region. The current incidence for the country as a whole was the highest since 1938, when approximately 150,000 cases were reported for this period.

Poliomyelitis.—Poliomyelitis (81 cases) continued at a relatively high level, due largely to an excess in the number of cases in the East South Central, Mountain, and Pacific regions. In the other six regions the number of cases either closely approximated the median or fell considerably below it. In several preceding years this disease has reached its lowest level during this season of the year.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—The diphtheria incidence was slightly higher than it was during the corresponding period in 1942, but it was only about 80 percent of the 1938–42 median. The reported number of cases for the 4 weeks ended April 24 was 903. The Middle Atlantic, East North Central, Mountain, and Pacific regions each reported an in-

crease over the corresponding period of 1942, but the Mountain region alone reported an excess over the median expectancy.

Influenza.—The influenza incidence was also higher than in 1942, but the number of cases (12,335) reported for the current period represented a slight decline from the 5-year median figure (12,584) for the corresponding period. The West South Central region continued to report the highest incidence and the Middle Atlantic region reported a minor excess over the median, but in all other regions the incidence was relatively low.

Scarlet fever.—For the current period there were 17,096 cases of scarlet fever reported, as compared with 14,085 for the corresponding period in 1942 and a 1938–42 median figure of approximately 18,000 cases. In the New England region the incidence (3,041 cases) was about 2.4 times the median and in the Mountain region the number of cases (855) was almost twice the seasonal expectancy. Minor increases over the median were reported from the South Atlantic, West South Central, and Pacific regions, but in the other four regions the incidence was below the median seasonal level.

Smallpox.—The number of cases of smallpox was higher than in 1942 but it was considerably below the 1938–42 median. Of the 38 cases reported from the East North Central region, 25 occurred in the vicinity of Steubenville, Ohio. A few more cases than might be expected were reported from the South Atlantic region, but in all other regions the incidence was considerably below normal for this season of the year.

Typhoid fever.—The incidence of this disease reached a new low level. For the 4 weeks ended April 24, there were 244 cases reported as compared with 308, 291, and 339 for the corresponding period in 1942, 1941, and 1940, respectively. The 1938–42 median for this period was 339 cases. In the New England, East North Central, and Mountain regions the numbers of cases closely approximated the medians, while in all other regions the disease was considerably less prevalent than in recent years.

Whooping cough.—The number of cases of whooping cough rose from approximately 16,000 during the preceding 4-week period to 17,116 during the current period. Compared with recent years the incidence was about 15 percent above the 1938–42 median. Each section of the country except the New England, Middle Atlantic, and Mountain regions contributed to this relatively high incidence. Of the nine geographic regions, six reported excesses over the normal incidence and in the other three regions the incidence was comparatively low.

MORTALITY, ALL CAUSES

For the 4 weeks ended April 24 there was an average of approximately 9,600 deaths per week in the group of large cities reported upon by the Bureau of the Census. The average for the corresponding weeks in 1940–42 was approximately 8,700 deaths. The current figure represents an increase over the preceding 3-year average of almost 10 percent. Because of excessive internal migration, no accurate population estimates can be made, so it is impossible to say how much of this increase in deaths is due to increased population and how much represents an increased death rate.

Number of reported cases of 9 communicable diseases in the United States during the 4-week period March 28–April 24, 1943, the number for the corresponding period in 1942, and the median number of cases reported for the corresponding period, 1938–42

Division	Current period	1942	5-year median	Current period	1942	5-year median	Current period	1942	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	903	872	1,104	12,335	11,481	12,584	103,989	96,465	96,465
New England	14	22	24	27	17	30	10,200	9,224	5,463
Middle Atlantic	163	132	175	145	71	92	26,935	10,294	10,294
East North Central	176	127	202	510	429	976	26,587	9,652	9,652
West North Central	62	91	91	108	298	303	8,132	10,319	7,223
South Atlantic	118	141	225	4,171	3,370	4,240	7,035	11,745	11,745
East South Central	62	83	88	1,076	917	1,262	4,341	1,634	1,634
West South Central	152	184	184	5,255	3,897	4,543	5,963	11,735	3,936
Mountain	74	44	66	681	1,240	706	6,851	5,167	3,832
Pacific	82	48	84	362	1,242	1,232	7,945	26,695	7,791
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	2,369	390	225	81	53	71	17,096	14,685	18,008
New England	274	45	14	3	2	1	3,091	1,876	1,315
Middle Atlantic	523	132	52	5	12	11	4,423	4,269	5,470
East North Central	272	25	25	5	7	9	4,247	4,219	6,341
West North Central	142	16	9	5	0	5	1,552	1,576	1,576
South Atlantic	441	76	54	6	10	10	1,120	897	871
East South Central	248	35	35	14	6	7	475	620	620
West South Central	143	28	19	7	7	10	492	292	336
Mountain	79	5	5	14	5	4	855	409	451
Pacific	247	28	11	22	4	5	841	527	778
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	105	95	277	244	308	339	17,116	14,182	14,592
New England	0	0	0	17	14	14	1,217	1,573	1,291
Middle Atlantic	0	0	0	37	54	61	3,164	3,724	3,423
East North Central	38	9	57	37	36	38	3,343	2,902	2,902
West North Central	8	21	129	10	15	19	1,031	531	531
South Atlantic	13	1	6	52	79	79	2,413	1,467	2,265
East South Central	17	15	18	23	35	42	723	666	636
West South Central	21	43	43	40	52	52	2,903	798	1,399
Mountain	2	1	39	16	6	14	577	815	864
Pacific	6	5	15	12	17	23	1,745	1,706	1,722

[1] Mississippi, New York, and Pennsylvania excluded; New York City included.
[2] Mississippi excluded.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 8, 1943

Summary

Totals below those for the preceding week were reported for all of the 9 common communicable diseases included in the following table, except meningococcus meningitis and whooping cough, and the incidence of only two—meningococcus meningitis and poliomyelitis—was more than slightly above the medians for the comparable weeks of the past 5 years (1938–42). The accumulated totals for the first 18 weeks of the year for only measles, meningococcus meningitis, and poliomyelitis are above the respective 5-year medians.

The total of meningococcus meningitis cases reported for the week was 604, as compared with 591 for the preceding week and an average of 588 for the past 3 weeks. The accumulated total of 8,816 cases for the first 18 weeks of the current year is more than was reported for any entire year since 1929, when 10,551 cases were reported. Figures for years earlier than 1929, though incomplete, and mortality figures issued by the Bureau of the Census indicate that the current incidence is probably higher than that of any prior year of record since 1913, with the single exception of 1929. Increases were recorded for the current week, and as compared with the averages for the past 3 weeks, in the South Atlantic, East South Central, and Pacific groups of States. Decreases occurred in all of the other geographic areas as compared with the preceding week and, except for the Middle Atlantic States, as compared with the preceding 3-week averages. States reporting the largest numbers (last week's figures in parentheses) were as follows: New York, 110 (76); California, 59 (34); Pennsylvania, 34 (36); Massachusetts, 33 (30); Illinois, 26 (29); Maryland, 25 (22); Ohio, 21 (17); Virginia, 21 (26); North Carolina, 21 (15); and Kentucky, 20 (16).

Poliomyelitis cases reported for the week totaled 26, as compared with a 5-year median of 13. Of the current number, 10 cases occurred in California and 4 each in Texas and Arizona. A total of 14 cases of Rocky Mountain spotted fever was reported for the week, 13 of which were in Mountain and Pacific States and 1 in South Dakota.

A total of 9,051 deaths was recorded in 87 large cities of the United States for the current week, as compared with 9,644 last week and 3-year average of 8,139. The cumulative total for 18 weeks of 1943 is 172,795, as compared with 157,210 for the same period of 1942.

Telegraphic morbidity reports from State health officers for the week ended May 8, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	May 8, 1943	May 9, 1942		May 8, 1943	May 9, 1942		May 8, 1943	May 9, 1942		May 8, 1943	May 9, 1942	
NEW ENG.												
Maine	0	0	0	------	------	2	15	142	177	2	6	0
New Hampshire	0	1	0	------	------	------	74	13	18	3	0	0
Vermont	0	1	1	------	------	------	276	154	72	1	0	0
Massachusetts	2	2	1	------	------	------	1,762	1,305	975	33	7	2
Rhode Island	1	1	0	------	------	------	11	225	66	14	0	0
Connecticut	0	2	2	------	1	3	442	556	302	9	1	0
MID. ATL.												
New York	11	15	15	[1] 13	[1] 8	[1] 8	3,628	929	2,181	110	19	7
New Jersey	5	4	4	17	4	6	2,090	906	906	12	4	1
Pennsylvania	5	8	20	1	2	------	1,678	1,711	1,711	34	0	1
E. NO. CEN.												
Ohio	16	6	16	14	7	7	889	500	42	21	0	1
Indiana	1	2	6	22	4	10	486	216	216	10	2	0
Illinois	29	10	20	13	4	11	1,942	396	396	26	0	1
Michigan [2]	5	4	4	63	1	1	2,286	438	629	12	2	1
Wisconsin	0	0	0	38	32	37	1,854	1,389	1,389	5	0	1
W. NO. CEN.												
Minnesota	3	1	1	------	------	2	390	875	254	1	0	0
Iowa	1	0	2	------	------	1	249	259	253	4	0	0
Missouri	2	1	3	3	1	2	282	378	378	13	3	1
North Dakota	0	1	1	27	------	6	182	35	31	0	0	0
South Dakota	0	0	0	------	------	------	86	23	14	3	0	0
Nebraska	1	6	1	3	11	------	157	416	233	0	0	0
Kansas	2	5	5	1	1	4	645	557	621	5	0	0
SO. ATL.												
Delaware	0	1	0	------	------	------	75	23	10	7	1	0
Maryland [2]	1	4	3	10	11	7	223	500	292	25	8	2
Dist. of Col.	1	1	0	2	------	------	77	121	121	5	3	1
Virginia	4	5	5	180	143	110	452	289	458	21	4	8
West Virginia	3	5	5	13	19	20	52	102	102	6	2	2
North Carolina	7	4	12	8	11	11	353	543	866	21	0	1
South Carolina	2	1	5	422	167	270	134	141	141	9	3	1
Georgia	4	1	3	29	17	38	229	164	164	5	1	1
Florida	2	6	2	10	4	4	87	306	220	12	0	0
E. SO. CEN.												
Kentucky	4	5	4	7	7	7	290	54	95	20	0	3
Tennessee	4	9	3	32	18	18	393	128	179	19	2	1
Alabama	4	5	5	60	49	45	156	198	264	9	3	1
Mississippi [2]	5	6	6	------	------	------	------	------	------	13	1	1
W. SO. CEN.												
Arkansas	4	7	4	16	47	58	122	111	155	[3] 3	1	0
Louisiana	2	2	2	5	3	9	173	191	75	5	2	2
Oklahoma	4	5	5	14	43	75	52	176	176	2	2	2
Texas	13	36	22	512	407	407	647	1,293	1,120	15	7	2
MOUNTAIN												
Montana	0	1	2	12	------	------	145	81	51	0	0	0
Idaho	0	1	0	2	------	------	58	57	30	6	0	0
Wyoming	0	0	0	6	110	------	162	67	52	0	0	0
Colorado	11	4	11	18	45	10	576	202	331	1	0	0
New Mexico	0	1	0	3	1	1	14	35	36	0	0	0
Arizona	0	1	1	42	56	56	36	127	98	0	0	0
Utah [2]	1	0	0	13	5	5	179	1,402	267	6	0	0
Nevada	0	0	------	------	------	------	16	24	------	0	0	------
PACIFIC												
Washington	7	1	1	------	5	------	389	377	377	14	1	1
Oregon	1	0	0	30	14	20	332	125	125	4	0	1
California	20	10	11	71	70	36	1,186	5,724	686	59	4	1
Total	188	192	215	1,732	1,328	1,532	26,032	23,979	23,979	[3] 605	89	47
18 weeks	4,742	5,070	6,185	70,068	72,364	141,425	340,866	329,134	329,134	8,817	1,400	897

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended May 8, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	May 8, 1943	May 9, 1942		May 8, 1943	May 9, 1942		May 8, 1943	May 9, 1942		May 8, 1943	May 9, 1942	
NEW ENG.												
Maine	0	0	0	12	14	15	0	0	0	0	0	0
New Hampshire	0	0	0	14	9	1	0	0	0	0	0	0
Vermont	0	0	0	15	7	7	0	0	0	0	2	0
Massachusetts	0	1	0	472	294	196	0	0	0	0	0	1
Rhode Island	0	0	0	28	12	12	0	0	0	0	0	0
Connecticut	0	0	0	124	30	77	0	0	0	1	3	0
MID. ATL.												
New York	3	1	1	553	408	613	0	0	0	7	4	5
New Jersey	0	0	0	148	147	223	0	0	0	0	5	4
Pennsylvania	0	1	1	262	423	423	0	0	0	0	6	7
E. NO. CEN.												
Ohio	2	1	1	320	314	314	6	0	1	0	11	9
Indiana	0	0	0	78	71	103	1	2	6	2	0	1
Illinois	0	3	0	156	148	308	0	1	2	2	5	5
Michigan [3]	1	0	0	112	148	356	0	1	5	1	0	1
Wisconsin	1	0	0	315	167	128	1	1	1	0	0	0
W. NO. CEN.												
Minnesota	0	0	0	70	79	79	0	0	2	0	0	0
Iowa	0	0	0	57	27	53	0	1	13	0	0	2
Missouri	0	0	0	91	55	81	0	0	17	1	0	1
North Dakota	0	0	0	11	17	9	0	0	1	0	3	1
South Dakota	0	0	0	13	21	15	3	0	1	0	0	0
Nebraska	0	0	0	17	24	23	0	0	2	1	0	0
Kansas	1	1	0	37	46	60	0	1	1	0	0	1
SO. ATL.												
Delaware	0	0	0	0	21	9	0	0	0	0	0	0
Maryland [3]	0	0	0	136	76	40	0	0	0	2	4	2
Dist. of Col.	0	0	0	22	5	14	0	0	0	0	0	1
Virginia	0	0	0	39	16	24	0	0	0	1	4	1
West Virginia	0	1	0	25	24	36	0	0	0	1	0	8
North Carolina	0	0	0	37	16	21	0	0	0	2	1	1
South Carolina	0	2	0	2	4	3	0	0	0	1	1	3
Georgia	0	1	1	6	5	12	0	1	0	2	6	6
Florida	0	0	1	12	8	8	0	0	0	4	17	4
E. SO. CEN.												
Kentucky	0	0	0	65	45	45	0	0	0	0	7	6
Tennessee	0	0	0	41	32	42	1	0	0	1	2	2
Alabama	0	1	1	11	13	12	3	0	0	2	4	4
Mississippi [3]	0	0	0	5	6	6	0	1	1	0	2	1
W. SO. CEN.												
Arkansas	0	0	1	0	3	3	0	2	2	2	1	3
Louisiana	0	0	0	10	1	4	0	0	0	2	5	5
Oklahoma	0	1	1	12	4	18	0	0	12	0	0	8
Texas	4	3	1	48	24	41	2	5	14	3	6	6
MOUNTAIN												
Montana	0	0	0	21	9	21	0	0	0	0	0	1
Idaho	0	0	0	112	0	5	0	0	0	0	0	0
Wyoming	0	0	0	3	17	11	0	0	0	0	0	1
Colorado	0	0	0	59	17	30	0	1	1	0	0	0
New Mexico	0	0	0	4	6	6	0	0	0	1	0	1
Arizona	4	0	0	9	6	6	0	0	4	1	0	0
Utah [3]	0	0	0	46	11	11	0	0	0	6	0	0
Nevada	0	0	------	0	0	------	0	0	------	0	0	------
PACIFIC												
Washington	0	0	0	37	35	31	0	0	0	0	0	1
Oregon	0	0	0	18	7	13	0	1	12	0	1	1
California	10	2	2	174	113	126	0	0	1	4	2	5
Total	26	19	13	8,859	2,975	4,090	17	18	95	50	102	115
18 weeks	455	377	377	71,761	69,339	86,787	476	395	1,332	1,029	1,405	1,461

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended May 8, 1943, and comparison with corresponding week 1942 and 5-year median—Continued

Division and State	Whooping cough, Week ended—, May 8, 1943	Whooping cough, Week ended—, May 9, 1942	Whooping cough, Median 1938-42	Week ended May 8, 1943: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENG.												
Maine	41	30	30	0	0	0	0	0	0	0	0	0
New Hampshire	6	3	3	0	0	0	0	0	0	0	0	0
Vermont	12	24	33	0	0	0	0	0	0	0	0	0
Massachusetts	136	258	166	0	0	8	0	0	0	0	0	0
Rhode Island	34	14	20	0	0	0	0	0	0	0	0	0
Connecticut	22	94	73	0	0	9	0	0	0	0	0	0
MID. ATL.												
New York	294	474	446	0	2	17	0	3	0	0	0	0
New Jersey	181	341	244	0	0	0	0	0	0	0	0	0
Pennsylvania	208	229	327	0	0	0	0	0	0	0	0	1
E. NO. CEN.												
Ohio	154	288	173	0	0	0	0	0	0	0	0	0
Indiana	47	42	42	0	1	0	0	0	0	0	0	0
Illinois	157	255	120	0	0	0	0	1	0	0	1	0
Michigan [2]	239	139	157	0	0	0	0	0	0	0	0	0
Wisconsin	209	247	143	0	0	0	0	1	0	0	0	0
W. NO. CEN.												
Minnesota	90	20	23	0	0	0	0	0	0	0	0	0
Iowa	21	18	31	0	0	0	0	1	0	0	0	0
Missouri	22	8	15	0	0	0	0	0	0	0	1	0
North Dakota	28	13	13	0	0	0	0	0	0	0	0	0
South Dakota	13	1	1	0	0	0	0	0	0	1	0	0
Nebraska	8	0	6	0	0	0	0	0	0	0	0	0
Kansas	136	36	40	0	0	0	0	1	0	0	0	0
SO. ATL.												
Delaware	0	0	8	0	0	0	0	0	0	0	0	0
Maryland [2]	128	52	64	0	0	0	0	0	0	0	0	0
Dist. of Col.	28	12	12	0	0	0	0	0	0	0	0	0
Virginia	118	43	61	0	0	0	28	0	0	0	0	0
West Virginia	51	11	33	0	0	0	0	0	0	0	0	0
North Carolina	203	115	285	0	1	1	0	0	0	0	0	0
South Carolina	67	64	99	0	1	11	0	0	0	0	0	1
Georgia	11	55	39	0	0	3	0	0	0	0	1	5
Florida	52	62	26	0	1	0	0	1	0	0	0	4
E. SO. CEN.												
Kentucky	39	79	79	0	0	0	1	0	0	0	0	0
Tennessee	72	55	42	0	0	0	1	0	0	0	1	0
Alabama	56	44	40	0	0	0	0	0	0	0	0	1
Mississippi [2]	------	------	------	0	0	0	0	0	0	0	0	0
W. SO. CEN.												
Arkansas	45	8	26	0	0	6	0	0	0	0	2	[3] 2
Louisiana	5	2	3	0	0	0	0	0	0	0	0	0
Oklahoma	37	2	33	0	0	0	0	0	0	0	0	0
Texas	612	347	291	0	8	146	0	1	0	0	1	15
MOUNTAIN												
Montana	15	17	17	0	0	0	0	0	0	4	0	0
Idaho	14	4	3	0	0	0	0	0	0	0	0	0
Wyoming	3	1	2	0	0	0	0	0	0	3	0	0
Colorado	23	18	40	0	0	4	0	0	0	1	0	0
New Mexico	4	20	35	0	0	0	0	0	0	0	0	0
Arizona	32	26	26	0	0	0	27	1	0	0	0	0
Utah [2]	66	21	65	0	0	0	1	0	0	1	0	0
Nevada	3	4	------	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	46	70	64	0	0	0	0	0	0	0	0	0
Oregon	19	19	19	0	0	0	0	0	0	3	0	0
California	582	283	354	0	4	2	0	1	0	1	0	0
Total	4,389	3,977	3,977	0	18	207	58	11	0	14	7	[3] 29
18 weeks	72,653	69,361	72,625	25	528	3,495	840	200	8	40	291	817
18 weeks, 1942	------	------	------	29	305	1,200	681	137	22	47	319	654

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Delayed report of 1 case of meningococcus meningitis and 1 case of typhus fever in Arkansas for the week ended May 1 included.

WEEKLY REPORTS FROM CITIES

City reports for week ended April 24, 1943

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENG.												
Maine:												
Portland	0	0	1	1	1	6	4	0	2	0	0	0
New Hampshire:												
Concord	0	0	------	1	1	0	1	0	0	0	0	0
Vermont:												
Barre	0	0	------	0	2	0	0	0	0	0	0	26
Massachusetts:												1
Boston	2	0	------	2	211	7	21	0	164	0	0	0
Fall River	0	0	------	0	104	0	1	0	1	0	0	4
Springfield	0	0	------	0	16	1	0	0	86	0	0	
Worcester	0	0	------	0	228	0	8	0	4	0	0	25
Rhode Island:												
Providence	1	0	1	0	4	7	6	0	12	0	0	0
Connecticut:												
Bridgeport	0	1	------	0	0	1	2	0	7	0	0	4
Hartford	0	0	------	0	53	1	4	0	7	0	0	2
New Haven	0	0	------	0	10	0	1	0	3	0	1	
MID. ATL.												
New York:												
Buffalo	0	0	3	0	81	5	8	0	8	0	0	4
New York	16	0	30	2	842	53	83	0	430	0	2	60
Rochester	0	1	------	0	102	0	6	0	12	0	1	13
Syracuse	0	0	------	0	78	3	2	0	17	0	1	19
New Jersey:												
Camden	1	0	------	0	0	0	2	0	2	0	0	0
Newark	0	0	4	0	334	0	6	0	12	0	1	31
Trenton	0	0	------	0	61	0	2	0	11	0	0	1
Pennsylvania:												
Philadelphia	3	0	1	0	233	12	19	0	134	0	0	52
Pittsburgh	1	0	1	1	30	7	19	0	11	0	1	30
Reading	0	0	------	0	91	0	2	0	2	0	0	8
E. NO. CEN.												
Ohio:												
Cincinnati	0	0	------	2	75	3	4	0	37	0	0	7
Cleveland	2	0	7	2	25	4	3	0	51	0	0	38
Columbus	0	0	------	0	46	0	6	0	20	0	0	4
Indiana:												
Fort Wayne	0	0	------	0	5	0	5	0	8	0	0	0
Indianapolis	1	0	------	3	235	1	9	0	38	0	0	32
South Bend	0	0	------	0	8	0	0	0	1	0	0	1
Terre Haute	0	0	------	0	10	0	2	0	0	0	0	0
Illinois:												
Chicago	14	0	1	1	828	13	27	0	74	0	0	51
Springfield	0	0	------	0	3	0	2	0	2	0	0	2
Michigan:												
Detroit	1	0	------	2	1,247	12	10	0	46	0	0	78
Flint	0	0	------	0	184	0	5	0	5	0	0	23
Grand Rapids	0	0	------	0	9	0	0	0	5	0	0	15
Wisconsin:												
Kenosha	0	0	------	0	1	0	0	0	4	0	0	0
Milwaukee	0	0	1	1	477	0	1	0	182	0	0	79
Racine	0	0	------	0	4	0	0	0	21	0	0	0
Superior	0	0	------	0	5	0	0	0	5	0	0	4
W. NO. CEN.												
Minnesota:												
Duluth	0	0	------	0	9	0	1	0	6	0	0	1
Minneapolis	0	0	------	0	133	1	2	0	21	0	0	16
St. Paul	0	0	------	0	24	0	4	0	2	0	0	28
Missouri:												
Kansas City	0	0	------	1	104	1	5	0	49	0	0	8
St. Joseph	0	0	------	0	2	0	8	0	0	0	0	1
St. Louis	0	0	2	2	38	12	10	0	18	0	0	10
North Dakota:												
Fargo	0	0	------	0	0	0	1	0	1	0	0	3
Nebraska:												
Omaha	0	0	------	0	10	0	4	0	5	0	0	2
Kansas:												
Topeka	0	0	------	0	189	0	3	0	1	0	0	29
Wichita	0	0	1	0	134	0	4	0	4	0	0	16

City reports for week ended April 24, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
SO. ATL.												
Delaware:												
Wilmington	0	0		0	26	0	1	0	0	0	0	1
Maryland:												
Baltimore	1	0	2	1	76	16	15	0	61	0	2	86
Cumberland	0	0	1	0	0	0	0	0	0	0	0	0
Frederick	0	0		0	3	0	0	0	0	0	0	0
Dist. of Col.:												
Washington	1	0	3	1	78	2	7	0	20	0	0	17
Virginia:												
Lynchburg	0	0		0	2	0	0	0	1	0	0	6
Richmond	0	0		0	9	2	2	0	0	0	0	1
Roanoke	0	0		0	0	0	2	0	0	0	0	0
West Virginia:												
Wheeling	0	0		0	62	0	1	0	1	0	0	5
North Carolina:												
Winston-Salem	0	0		0	1	0	2	0	0	0	0	12
South Carolina:												
Charleston	1	0	3	1	5	3	3	0	1	0	1	4
Georgia:												
Atlanta	0	0	14	1	24	0	7	0	8	0	0	3
Brunswick	0	0	1	1	4	1	5	0	0	0	0	0
Savannah	0	0		1	1	0	2	0	0	0	0	1
Florida:												
Tampa	0	0		0	4	0	6	0	0	0	0	0
E. SO. CEN.												
Tennessee:												
Memphis	0	0	5	0	245	2	3	0	1	0	0	20
Nashville	0	0		1	23	0	2	0	2	0	0	9
Alabama:												
Birmingham	0	0	7	0	11	0	4	0	0	0	0	3
Mobile	1	0	1	0	0	1	1	0	1	0	0	0
W. SO. CEN.												
Arkansas.												
Little Rock	0	0		0	7	0	[illegible]	0	1	0	0	0
Louisiana:												
New Orleans	0	0	2	1	31	5	9	0	3	0	1	0
Shreveport	0	0		0	0	0	3	0	0	0	0	0
Texas												
Dallas	0	0	1	1	6	0	4	0	4	0	0	16
Galveston	0	0		0	5	0	2	0	0	0	0	11
Houston	0	0		2	6	1	3	0	4	0	0	7
San Antonio	2	0	1	1	3	0	3	0	1	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0		0	2	0	0	0	0	0	0	3
Great Falls	0	0		0	50	0	1	0	0	0	0	1
Helena	0	0		0	31	0	0	0	0	0	0	0
Missoula	0	0		0	5	0	0	0	1	0	0	0
Idaho:												
Boise	0	0		0	4	0	0	0	0	0	0	0
Colorado:												
Denver	1	0	7	0	425	1	6	0	11	0	1	9
Pueblo	0	0		0	20	0	1	0	2	0	0	11
Utah:												
Salt Lake City	0	0		0	112	1	1	1	5	0	0	50
PACIFIC												
Washington:												
Seattle	1	0		1	208	1	2	0	2	0	1	15
Spokane	0	0		0	82	0	1	0	0	0	0	4
Tacoma	2	0		0	8	1	0	0	4	0	0	3
California:												
Los Angeles	2	0	19	2	117	2	8	1	20	0	0	49
Sacramento	1	0		0	8	4	3	0	0	1	0	4
San Francisco	0	0	1	0	75	6	13	0	26	0	2	22
Total	55	2	121	36	8,066	199	434	2	1,711	1	15	1,107
Corresponding week, 1942	58	3	103	26	6,327	33	368	2	1,384	0	14	1,195
Average, 1938–42	77		162	[1] 34	[2] 6,199		[1] 416		1,598	10	18	1,153

Dysentery, amebic.—Cases: New York, 1.
Dysentery, bacillary.—Cases: New York, 5; Philadelphia, 1; Detroit, 3; Los Angeles, 5.
Dysentery, unspecified.—Cases: San Antonio, 7. *Tularemia.*—Cases: Atlanta, 1; Little Rock, 1.
Typhus fever.—Cases: Savannah, 1; Mobile, 1; San Antonio, 1.

[1] 3-year average, 1940–42. [2] 5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1942, 34,614,400)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New Eng.	7.5	2.5	5.0	9.9	1,565	57.1	119.3	0.0	711	0.0	2.5	176
Mid. Atl.	9.4	.4	17.4	1.3	826	35.7	66.5	0	284	0	2.7	97
E. No. Cen.	10.5	0	5.3	6.4	1,846	19.3	43.2	0	291	0	0	195
W. No. Cen.	0.0	0	5.9	5.9	1,257	27.4	72.3	0	209	0	0	223
So. Atl.	5.3	0	42.6	10.6	523	42.6	94.0	0	163	0	5.3	234
E. So. Cen.	5.9	0	77.2	5.9	1,657	17.8	59.4	0	24	0	0	190
W. So. Cen.	5.9	0	11.7	14.7	170	17.6	79.2	0	38	0	2.9	103
Mountain	8.0	0	56.3	0.0	5,218	16.1	72.4	8.0	153	0	8.0	595
Pacific	10.5	0	35.0	5.2	870	24.5	47.2	1.7	91	1.7	5.2	170
Total	8.3	0.3	18.2	5.4	1,215	30.0	65.4	0.3	258	0.2	2.3	167

PLAGUE INFECTION IN TACOMA, WASH.

Plague infection has been reported proved in pools of fleas and tissue from rats, *R. norvegicus*, collected in frame buildings in industrial districts of Tacoma, Wash., as follows: April 12, 90 fleas from 103 rats; April 20, 53 fleas from 84 rats, and 50 fleas from 120 rats; April 21, tissue from 4 rats; April 22, 118 fleas from 28 rats.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—February 1943.—During the month of February 1943, certain notifiable diseases were reported in the Panama Canal Zone, and terminal cities, as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	16		6		10		2		34	
Diphtheria	12	1			4		4		20	1
Dysentery (amebic)	1		2		1		4		8	
Dysentery (bacillary)	2				3		1		6	
Malaria [1]	27		4		313	1	112	2	456	3
Measles	3				12				15	
Mumps	25		1		16		13		55	
Paratyphoid fever			1		4		1		6	
Pneumonia		9		4	39	2		3	[2] 39	18
Relapsing fever							1		1	
Scarlet fever			1						1	
Tuberculosis		23		1	3	5		8	[2] 3	37
Typhoid fever	1		1		1				3	
Whooping cough					2				[2] 2	

[1] Includes 100 recurrent cases.
[2] Reported in the Canal Zone only.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended April 10, 1943.—During the week ended April 10, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		9		112	209	23	14	35	58	460
Diphtheria		12	3	16		5				36
Dysentery (bacillary)				7						7
German measles		8		41	88	1	3	20	4	165
Influenza			4		86	6	2		100	198
Measles		92	2	217	833	110	225	122	317	1,918
Meningitis, meningococcus				4	6	3		1		14
Mumps	3	52	2	109	1,083	152	116	66	170	1,753
Poliomyelitis				1			1			2
Scarlet fever	1	19	9	148	247	40	45	43	20	572
Tuberculosis (all forms)	2	14	4	70	44	23	27	2	22	208
Typhoid and paratyphoid fever		2	3	60						65
Undulant fever				1	3					4
Whooping cough				59	104	76	20	23	26	308

HAITI

Anthrax.—For the period April 8–19, 1943, 3 human cases of anthrax are reported to have been hospitalized in Gonaives, Haiti.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Indochina—Cochinchina.—For the period January 11–20, 1943, 3 cases of plague with 3 deaths were reported in Cochinchina, Indochina.

Morocco.—During the month of February 1943, 19 cases of plague were reported in Morocco.

Typhus Fever

Guatemala.—During the month of March 1943, 146 cases of typhus fever with 19 deaths were reported in Guatemala.

Irish Free State—Leitrim County.—During the week ended April 10, 1943, 3 cases of typhus fever were reported in Leitrim County, Irish Free State.

Spanish Morocco—Melilla.—For the week ended February 6, 1943, 1 case of typhus fever was reported in Melilla, Spanish Morocco.

DEATHS DURING WEEK ENDED MAY 1, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended May 1, 1943	Corresponding week, 1942
Data from 90 large cities of the United States:		
Total deaths	9,986	8,638
Average for 3 prior years	8,495	
Total deaths, first 17 weeks of year	170,099	154,794
Deaths under 1 year of age	662	613
Average for 3 prior years	533	
Deaths under 1 year of age, first 17 weeks of year	11,784	9,769
Data from industrial insurance companies:		
Policies in force	65,501,549	65,234,283
Number of death claims	12,537	12,164
Death claims per 1,000 policies in force, annual rate	10.0	9.7
Death claims per 1,000 policies, first 17 weeks of year, annual rate	10.6	10.2

COURT DECISION ON PUBLIC HEALTH

Possession of shellfish received from unregistered shipper.—(New York Court of Appeals; *People* v. *Thompson & Potter, Inc.*, 45 N.E.2d 432; decided December 3, 1942.) The New York City Sanitary Code provided that no dealer in shellfish or other foods should "purchase or have in his possession" shellfish received from a shipper of shellfish not registered for shipping shellfish into the city. The defendant, a wholesale commission house dealing as a broker in shellfish, was convicted by the trial court of having in its possession three bags of oysters received from a shipper who was not registered with the health department as an approved shipper of shellfish into the city. It appeared that on a particular day 40 shipments of shellfish were delivered before 6 a. m. when the defendant opened its place of business and that the market watchman admitted the shipments into the premises. An officer and an employee of the defendant arrived about 6 a. m., but claimed that they had not completed their checking of these shipments by 11 o'clock because of the rush of business. A health department inspector found two of the bags of oysters involved at 9:45 a. m. and the third at 11 a. m. Preceding each inspection the inspector inquired in effect whether the defendant had any shipments from unregistered sources and was told "No." The defendant had a list of approved shippers in its office with which it was its duty to compare the tags on the bags and return goods not on the approved list.

The Court of Appeals of New York said that the purpose of the New York City ordinance was to protect the consumer against the danger of disease involved in eating shellfish taken from sources which were not approved by the health authorities. According to the court a decisive point in the case was the proper construction of the term "possession" as used in the ordinance, and respecting this the

court found nothing unreasonable in construing the provision as it was written, namely, that the mere receipt of shellfish into a dealer's premises constituted "possession" within the meaning of the sanitary code. A contrary holding, said the court, would render the enforcement of the code almost impossible and expose the consuming public to the very danger against which protection was sought. "To allow contaminated shellfish to be mingled with a dealer's goods for any period of time involves the peril that the shellfish may be resold to the consuming public without detection by the health authorities, since it is shown that the turnover in this business is both large and immediate." The ordinance was said to be a fair and appropriate exercise of the police power as applied to the subject matter and designed to protect the public health. As applying with force in the instant case, the following was quoted from the opinion in a prior case: "Food laws are designed primarily, not for the punishment of the dealer, but for the protection of the consumer. In this field of law, the obligation to beware is on the seller rather than the buyer. Lack of proof of guilty intent does not satisfy that obligation."

The judgment of the trial court was affirmed.

×

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 58 MAY 21, 1943 NUMBER 21

IN THIS ISSUE

National and Local Nutrition Programs in Canada

Cooperative Nutrition Work in North Carolina

Public Health and National Nutrition Problems

CONTENTS

Public Health Reports

Vol. 58 • MAY 21, 1943 • *No. 21*

NATIONAL, PROVINCIAL, AND LOCAL NUTRITION PROGRAMS IN CANADA[1]

By G. F. AMYOT, M. D., *Provincial Health Officer, British Columbia*

In discussing nutrition, I will deal with the matter on a National, Provincial (comparable to State), and local basis to give you an idea of the type of program which is now being undertaken in Canada.

In 1939, under the auspices of the Canadian Council on Nutrition, a survey was conducted to ascertain the eating habits of a cross section of our population. This survey was conducted in the cities of Halifax, Quebec, Toronto, and Edmonton. The survey was not the type often carried on by agricultural departments, boards of trade, and chambers of commerce, in which food consumption is computed from the amounts produced, imported, and sold. Nor was it the family inventory method, where the determination is made from the amount of food consumed by the entire family.

The data were collected from volunteer families on an individual basis within the family. Home economics teachers and nutritionists visited each home of the families that had signified willingness to cooperate in the survey. The mother, in cooperation with the workers, ascertained the actual amount of food (by weight) consumed by each member of the family, on scales provided by the nutritionist. The nutritionist visited the home periodically during the survey. The standard of food requirements was the amount recommended by the Canadian Council on Nutrition checked with authorities in the United States. It was assumed that anything under 70 percent of the accepted requirements showed a definite shortage. Protein, calcium, iron, the different vitamins, etc., were all checked. Thus, 70 percent or less of the recommended allowance was considered a deficiency.

The results of this survey showed 40 percent of the population to be on the border line. Forty percent were not getting a sufficient amount of the proper foods according to the accepted standards. And only 20 percent were receiving amounts of food considered adequate to provide the normal requirements of the body.

In 1941 a division of the Federal Department of Pensions and National Health in Ottawa was set up, and this division is now known

[1] Read before the Fifty-Eighth Annual Conference of State and Provincial Health Authorities of North America, March 23, 1943, Washington, D. C.

as our National Nutrition Services. The division is under the direction of Dr. L. B. Pett, a physician also trained in agriculture and biochemistry. The staff includes, in addition, an assistant nutritionist and three field workers.

The first interest of Nutrition Services was the war industries. Its aim was to encourage management and labor to take an active interest in the eating habits of workers, both in the plants and the homes. Where it was not economically sound to provide cafeteria service, management was urged to make available suitable accommodations where workers could eat their lunches. Some supervision of the food consumed by the workers was advocated.

The bulk of the work done by Nutrition Services for the first year consisted of that in industrial plants, plus the preparation of materials that could be utilized through the nine Provinces in the development of nutrition programs. The Nutrition Services advocates a broad national nutrition policy and uses every means possible to bring it to the attention of the people, including advertising, radio, etc. The Provinces agree to follow these broad policies and are developing programs designed to activate the policies.

All research and technical material is being developed through national resources in cooperation with other countries and with other nutritional agencies. Such work will not be left to the individual Provinces. Consultation services are also provided on a national basis.

Provincial nutrition committees have been organized in all but three of the nine Provinces. Some time ago, the Province of Quebec appointed a nutritionist to work in conjunction with the Provincial health department. She was the first nutritionist to be appointed to the staff of a Provincial health department. I am pleased to say that our Province, British Columbia, was the second Province to add a nutritionist to the health department staff. In the other Provinces, nutritionists who are employed by the education services, agriculture departments, etc., are being utilized to help with the Provincial program.

I discuss the program in British Columbia without any apologies because it presents an example of the possible variation in methods that can be utilized, without deviating from the policies set down by National Nutrition Services, and because I know more about that particular program than I do about any of the other Provincial programs.

Following the appointment of the public health nutritionist in October 1942, a committee was formed—the Provincial nutrition committee—with the Provincial health officer as chairman, and the nutritionist as secretary. This committee consists of well chosen nontechnical people who represent as far as possible the leaders in

the Province. There are some 13 or 14 members at the present time and more can be added if necessary. In addition to this Provincial nutrition committee we also have appointed a technical advisory committee which is composed entirely of technical personnel in various related fields, including dietitians, home economics teachers, industrial nutritionists, agriculture specialists, public health and other technical persons as available.

The reason for the two committees was to prevent the Provincial nutrition committee from becoming a debating ground on the technical phases of nutrition. Nutrition Services in Ottawa has formulated Canada's official food rules, and set broad policies as stated before. Our aim at the present time is to stimulate as many of the people as possible to live up to those rules. This applies whether they eat in their own homes, in restaurants, or carry their lunches to work, and it is hoped that they can be induced to apply these simple rules of good nutrition. Plans are formulated so as not to confuse the public with a lot of technical and changing knowledge about the intricacies of nutrition. We wish to try to interest them in the effective use of food. There are many difficulties, due to food shortages, local or national, where intelligent guidance is always needed.

Following the appointment of the Provincial committee, the Canadian Red Cross appointed a nutritionist to work in cooperation with the Provincial nutritionist throughout British Columbia. Therefore, we now have two nutritionists whose full time is occupied in furthering this program on a joint basis. The Red Cross naturally is represented on the Provincial committee.

The program has already been started in the Okanagan Valley, the rich fruit producing area, under the supervision of the local health unit, and the local health unit director is chairman of the committee. He has utilized most of the suggested methods and policies outlined by the Nutrition Services, but has developed in addition a slightly different method of community organization, using a modified "block system."

In the Okanagan Valley, the first step was a very rapid survey of the lunches of the school children, and in addition the food consumed for breakfast and the evening meal before. It is surprising that even this very sketchy appraisal gave the same figures that the national study had given—40–40–20—and yet the Okanagan Valley is the richest fruit and vegetable producing part of the Province. The lunches, breakfasts, and dinners or suppers of the children were very much of the same type as those of persons living in cities. This method brought home to the local people the need for taking a greater interest in the nutrition of their children.

This local committee has, with the help of the Provincial nutritionist, prepared four nutrition bulletins. These are distributed to

parents through the schools, the well baby clinics, and through any other source by which they can get to the homes. These bulletins outline certain simple little points that it is felt will help the mother provide more nourishing food for her family. There is nothing complicated or technical about the bulletins. The last one is in the form of a questionnaire which is to be returned, and from which it is hoped that the problems each mother has to deal with in her own home will be found. It is planned to help with these problems through the public health nurses and home economics teachers in the area, with the aid of the committee.

At the same time a well balanced lunch program is being carried on in the schools. Lunch programs are now also in progress in various industrial plants in British Columbia.

When the public health nurses meet for their 4-day conference just before Easter this year a large proportion of the available time is going to be devoted to nutrition. During that time the nurses will be given an explanation and detailed methods of the various programs that are then in operation. In addition, they will be given material that will help them to go out and "sparkplug" their local communities to create an active interest in a nutrition program.

Last year when the public health nurses met they were prepared for this program by a series of talks by Dr. Jennie Rowntree of the University of Washington who is an excellent lecturer on nutrition. The Provincial nutritionist, aided by the nutritionist from the Red Cross, will act as consultant to the local public health nurses, home economics teachers, dietitians, and the committees and local groups, and help them get their programs into operation.

There is nothing complicated or difficult about this program. It will include victory gardens, food production, conservation of food, and the various methods of food preservation, preparation, and serving, that can be used. Dehydration will likely have to be used extensively as a means of preservation. Our agricultural experimental farms have developed methods of home dehydrating without expensive equipment. This will aid in meeting the shortages of cans and jars and the other problems, including sugar, related to canning methods and the preservation of food.

It is hoped that we can at least improve the situation as it now stands and that more people will provide the foods they require for good nutrition. If we can help the people at a time when good nutrition is becoming more and more difficult, and yet essential too in an all-out war effort, some of their most urgent nutritional problems will have been met. We must help them to solve the problems that they meet in the every day surroundings of their own homes and communities.

A COOPERATIVE NUTRITION PROGRAM IN NORTH CAROLINA[1]

By JOHN F. KENDRICK, M. D.[2]

The field of nutrition is broad. It touches every phase of modern life. The range between the highest possible level of nutrition and the starvation state is wide, and within that range are to be found many levels or degrees of nutritional status. These levels are dependent upon numerous factors which operate to produce nutrition problems. These responsible factors include: Social, economic, industrial, educational, agricultural, medical, and public health considerations.

We are all familiar with the much quoted estimate that no less than a third of the Nation has poor diets (*1*). Likewise we are familiar with the alleged relationship between poor nutrition and the physical unfitness of men rejected by our war examining boards (*2*), as well as with the numbers of school children found with defects which seem to be primarily of dietary origin. If we had at our command more precise techniques and methods of measuring concentrations in the body of dietary factors known to be essential, perhaps such estimates as are now possible would need to be revised either upward or downward. But in spite of the imperfection of our knowledge of nutrition and of our methods of appraising the nutritional status of population groups, there are convincing indications that a high prevalence of malnutrition of varying degrees of severity exists throughout the Nation.

Clearly defined nutritional diseases such as pellagra, rickets, scurvy, and beriberi were recognized long ago as public health problems. The challenge that these diseases presented was accepted by medical and health workers, and great progress has been made in controlling them. More recently dietary studies of individuals and groups, careful medical examinations, and special laboratory tests have made it possible to detect certain early or preclinical nutrition deficiencies which previously had not been clearly discernible. This work has made it clear that many obscure complaints are due, wholly or in part, to dietary deficiencies not severe enough to produce the classical picture of any known disease.

The habitual intake even of suboptimal amounts of nutrition essentials contributes to the improper functioning of body processes, to lowered resistance, to ill health, and lessened efficiency, and places

[1] Read before the Fifty-Eighth Annual Conference of State and Provincial Health Authorities of North America, March 23, 1943, Washington, D. C.

[2] Member, Field Staff, Rockefeller Foundation; assigned duties with the North Carolina State Board of Health.

upon those responsible for the welfare of the public a demand they cannot afford to ignore. Even with the frank admission that there is much still to be learned about nutrition, including a more exact knowledge of the incidence, severity, and distribution of malnutrition and the factors contributing to it, there seem to be few logical reasons for further delay in the application of measures which in the light of such knowledge as we now have offer promise of magnificent returns in terms of human health, efficiency, and happiness.

Statements purporting to acquaint the public with the magnitude and the seriousness of the problem of malnutrition existing in the United States have been broadcast throughout the Nation by all known channels of communication. Some of these messages have emanated from qualified experts, some have come from persons less well qualified, while others have been strongly suggestive of unadulterated propaganda. These intensive efforts, with a host of other activities which were intended to exert some influence on the nutrition of the people, have caught the public imagination and have created a public desire for some sort of action.

The nutrition problem obviously is one that cannot be solved by any single agency working alone. Fortunately, for a long time a number of agencies have recognized the contribution that improved food habits could make to the public health and have attacked the problem from different angles. Since these agencies were organized to perform specialized services of one kind or another, it was natural that the approach of each to the nutrition problem would be different. Some of these have accomplished gratifying results. Yet there has been a growing recognition among them of the fact that a knowledge of the activities of other agencies seeking the same objectives, plus the application of teamwork or coordinated action by all groups concerned, offers possibilities of far greater accomplishments. The war has crystallized this attitude.

Under national leadership, nutrition committees have been set up in States, counties, and cities, and plans have been made to promote better nutrition through them. North Carolina like all other States has adopted this general form of organization as a logical method of attacking its wartime nutrition problem as well as providing the framework for the conduct of a peacetime nutrition program.

Five considerations were uppermost in connection with the effective organization and operation of these State and local committees in North Carolina: (1) Measures designed only for the purpose of meeting the war emergency are not likely to solve fundamental nutrition problems which existed before the war, and which had no relation to it. Emergency plans and operations may serve to prevent lowering of the present nutritional status, and they may even produce some ameliora

tion. But a satisfactory approach to the solution of the problem may be expected only as a result of work over a long period of time. (2) As a step to insure continuation of service after the war, it was regarded as highly important that the membership of the State committee include the directors of those State services, and Federal services operated in the State, that perform any kind of nutrition work or have a special interest in nutrition. These directors have representatives throughout the State and our thought was that sustained interest at the top would be reflected throughout the entire service. These local representatives, of course, should be members of county and city committees and should take prominent parts in these local nutrition programs. (3) A high degree of cooperation among these groups and of coordination of their nutrition services would be of the utmost importance. (4) It should be clear to all concerned that the purpose of these committees is not to usurp any of the functions of groups already operating in the field of nutrition. The purpose is rather to amplify and intensify those services, to discover needs that are not being met and to provide machinery for meeting them, and to coordinate all activities into a well-rounded nutrition program. (5) The contributions that may be made to nutrition services by professional and lay groups, as well as the government groups already referred to, should not be overlooked. These should have representation on committees, and their services should be utilized as fully as possible.

These committees are the focusing point of all groups that participate in the nutrition program. What is sought is a cooperative nutrition enterprise which can fully utilize the services of all agencies which can participate advantageously in the attainment of the established objectives.

A North Carolina State Nutrition Committee, which will be referred to later, was organized in January 1940 for the purpose of undertaking to assess the nutritional status of population groups in communities of the State, and also to carry on appropriate nutrition research. As war clouds began to gather, public interest in nutrition increased. The President called a National Nutrition Conference in May 1941, and in the following July the State committee membership was enlarged, and its original "assessment and research" program was supplemented by plans to include the promotion of State-wide nutrition improvement activities.

The State nutrition committee is composed of 62 members, representing government departments (State and Federal), nutritionists and other scientists, voluntary agencies, home economics departments of colleges in the State, home economics women in business, and others interested in nutrition. The functions of the committee are advisory,

not administrative. As coordinator of nutrition activities, the State committee attempts to keep its constituent groups informed about the work of various agencies in the State so as to promote coordinated efforts and avoid duplication.

The directors of seven State or Federal departments are members of the committee, and compose within it what is known as the administrative board. The departments represented are: Agriculture, Agricultural Extension Service, Education, Health, Welfare, Farm Security Administration, and Work Projects Administration. This is the policy-forming board of the committee, and it also serves the important function of bringing their local representatives into the same relation with local nutrition committees as they themselves have with the State committee. Knowledge that a State director approves and supports the cooperative nutrition program goes a long way toward securing the support of local programs by his representatives.

Perhaps the most important function of the State nutrition committee has been the promotion of county organizations and the supplying of advisory services to these committees. The plan of organization recommended to counties provided for a nutrition committee in each county with subcommittees identical with the subcommittees of the State nutrition committee, namely:

1. Publicity and information.
2. Food production.
3. Food conservation and utilization.
4. Public health and clinical nutrition services.
5. Education in nutrition through the regular school program, through the school lunch program, and for adults.
6. Nutrition services for industrial groups.

To date (March 1943) 85 of the 100 counties of the State have organized under this plan. In addition to their own local programs, these committees have taken an active part in the share the meat campaign, in the victory garden program, and in a State-wide food preservation program, which the State nutrition committee is promoting this month.

Although it should be done, it is not within the scope of this paper to attempt to outline the established policies, functions, and activities of each of the agencies offering nutrition services in North Carolina. Suffice it to say that each cooperating agency has intensified its nutrition activities and has coordinated them with the cooperative program. Most of those at this conference, however, are health officials who realize that health departments are the principal agencies, on either State or local levels, which can apply public health concepts to nutrition programs. So, in view of your special interest in the role of health departments in these programs, the remainder of this paper will be

devoted to steps that have been taken or are being taken by the North Carolina State Board of Health to render appropriate services in this field.

The maintenance of health is the primary reason for the existence of health departments, and since nutrition is an important factor in the maintenance of health, it is obvious that State and local health departments must take an active part in formulating the programs of nutrition committees as well as in the carrying out of these programs. Certainly upon health departments should fall responsibility to share in nutrition research and to conduct surveys or studies to define existing nutrition problems. Health departments also should assist in directing all activities along sound scientific channels and in restraining tendencies of overzealous workers to claim for nutrition more than scientific facts would reasonably justify.

The North Carolina State Board of Health is fully aware of the importance of nutrition to public health. It also recognizes that the department has a responsibility to fulfill in this field which can be neglected no longer nor delegated to some other agency. The divisions of preventive medicine and oral hygiene have emphasized nutrition in their work for a decade or more, but both have been handicapped by the absence of nutritionists among the personnel of the State board of health.

In 1939 the State board of health took two significant steps toward the assumption of its responsibilities in the field of nutrition. The first of these was the organization of a school health coordinating service, sponsored jointly by the State board of health and the State department of public instruction. The second was the completion of plans for the inauguration of a cooperative nutrition study to be conducted under the auspices of the State board of health, Duke University, and The Rockefeller Foundation.

The school health coordinating service includes on its staff a nutritionist whose primary function is to study and improve the food habits of children in the public schools of the State. The nutritionist gives her entire time to this work throughout the school year. Beginning in 1940, the coordinating service has conducted child health courses and conferences in two white and two Negro colleges each summer. Each of these conferences lasts six weeks. During this time teachers, principals, and health workers study intensively those factors which affect child health, especially nutrition (*3, 4, 5*). The nutrition work is made very practical by the observation and study of groups of malnourished children who attend day camps and are given nourishing but low-cost meals.

The cooperative nutrition study was inaugurated on January 1, 1940. The nutrition laboratory was established in the biochemistry department of Duke University Medical School. A technical advisory

committee was chosen from the members of the departments of biochemistry, physiology, and medicine to supervise and improve the techniques and methods employed. The personnel of the staff of the cooperative nutrition study consists of a director, an associate director, a nutritionist, an assistant nutritionist, two biochemists, four technicians, and a secretary. The studies undertaken include a medical history, a physical examination, a 7-day food intake survey of each individual, and a laboratory examination of 25 cc. of a sample of blood from each person studied. The procedures followed have conformed in general to those recommended in the Report of a Conference on Methods and Procedures (*6*). By the end of 1942, studies of population groups in two counties had been completed. This included certain reexaminations to determine seasonal variations in the food intake and the effect of these variations as reflected by examinations of the blood (*7*). Studies were made also during this period of several school groups and a National Youth Administration group (*8*).

The primary purpose of the study is to disclose, as far as possible, by the use of available methods and techniques, the cause, incidence, severity, and distribution of malnutrition in statistically significant groups of population. A committee consisting of scientists and administrators was organized to consider the various practical factors which should be studied both in the field and in the laboratory. This was the original North Carolina State Nutrition Committee, previously referred to. The plans of this committee did not contemplate the inauguration of control or preventive activities until the nutrition problem had been explored, at least partially. But impending war, and later war itself, brought demands for nutrition improvement activities, and this expansion of the program called for an increase in the membership of the State nutrition committee, which would include representatives of all official and voluntary organizations in the State which had a special interest in nutrition. Thus, the addition to the committee of persons with training and experience in the practical application of knowledge in such fields as food production, food conservation, education, and publicity, gave North Carolina a State nutrition committee to study, plan, promote, and supervise all aspects of the State's nutrition program.

With the organization of local nutrition committees and the efforts of these to inaugurate nutrition improvement programs, have come demands for kinds of assistance that can be provided only by trained and experienced nutritionists. While the work of some local committees has been performed on a very efficient basis, the necessary planning and organizing requires the services of persons with better training and more experience than can be found in the average county. In addition to advisory services of a rather detailed nature needed by these local committees, similar services are needed by State institu-

tions, health clinics, school lunch programs, and industries. Steps have been taken to provide for these services, and a budget has been approved. This budget provides a medical nutritionist, a principal nutritionist, and two senior nutritionists on the State level. Funds are available also for the employment of several nutritionists on the county level, the number depending upon the willingness of counties to assume part of the financial responsibility. One county has already arranged to employ a nutritionist on this basis, beginning May 1, 1943. She will serve on the staff of the county health department. As soon as this additional staff has been employed, a division of nutrition will be established within the State department of health. The director of this division then will assume responsibility for the entire nutrition program of the department.

REFERENCES

(1) Stiebling, Hazel K., and Phipard, Esther F.: Diets of Families of Employed Wage Earners and Clerical Workers in Cities. U. S. Department of Agriculture, No. 507, July 1939.
(2) Hershey, Lewis B.: Selective Service and Its Relation to Nutrition. Proceedings, the National Nutrition Conference for Defense, May 1941. Government Printing Office, Washington, D. C., 1942.
(3) Wilkins, Walter, and Boyd, French: A nutrition demonstration as a tool for teacher training. J. School Health, 12: 35–42 (February 1942).
(4) Milam, D. F., and Wilkins, Walter: Plasma vitamin C levels in a group of children before and after dietary adjustment. Am. J. Trop. Med., 21: 487–491 (May 1941).
(5) Milam, D. F., and Wilkins, Walter: Vitamin C in normal nutrition. So. Med. and Surg., 104: 191 (April 1942).
(6) Nutrition survey of population groups, report of a conference on methods and procedures. Pub. Health Rep., 57: 189–194 (February 6, 1942).
(7) Milam, D. F.: A nutrition survey of a small North Carolina community. Am. J. Pub. Health, 32: 406–412 (April 1942).
(8) Manning, F. H., and Milam, D. F.: Medical and nutrition survey of 800 N. Y. A. youths. So. Med. J., 36: 373–380 (May 1943).

THE ROLE OF THE HEALTH DEPARTMENT IN THE NATIONAL NUTRITION PROGRAM[1]

By W. H. Sebrell, *Senior Surgeon*, and Walter Wilkins, *Surgeon (R), United States Public Health Service*

Today we are facing perhaps the greatest and most complex problem in preventive medicine that this country has ever had. It is the problem of food and nutrition. It has already taken too long for public health officials to recognize that malnutrition is a problem in preventive medicine.

Research in nutrition in the past few years has been so successful that we now have a body of technical knowledge sufficient to enable us to plan for adequate nutrition on a sound foundation. There is no question that a large proportion of the American population exists

[1] Presented at the Forty-first Annual Conference of the State and Territorial Health Officers with the United States Public Health Service, Washington, D. C., March 24, 1943.

on suboptimal diets. We have, to some extent, in this country every dietary deficiency disease known to man.

Health officers must recognize that here is a whole new sphere of health department responsibility. If the health officer's function is that of preserving the health of his people, then, in this field, he has been overlooking one of the basic and most important of all factors in maintaining health. Here is a new field of preventive medicine as great or greater than the development of sanitation or the control of communicable diseases. The ultimate aim of every nutrition program in this country today is the maintenance of good health. It is unfortunate that these programs should have developed and should continue to develop with the health officer either in a very minor role or not participating at all. He should be one of the leaders instead of a conscript.

Now a word about the extent of the problem and what is being done, and then we will make some suggestions for health department programs.

There appears to have been a feeling on the part of some physicians, who do not recognize many cases of advanced deficiency disease, that we are overemphasizing the importance of the nutrition problem. In every clinic in which close observations are made and the more refined methods of diagnosis used, many cases of malnutrition are recognized. It is not insignificant that practically all practicing physicians are prescribing vitamin preparations for many of their patients. Yet every study reveals the importance of mild degrees of deficiency in producing hitherto unrecognized symptoms. For example, a recent study by Johnson and his associates at the Harvard Fatigue Laboratory (*1*) showed that 10 men subjected to hard physical work on a diet deficient in parts of the vitamin B complex, notably in thiamin, showed a marked deterioration in their physical fitness in 1 week, and a majority developed symptoms of muscle and joint pains, poor appetite, and constipation.

Carefully conducted studies and surveys have shown that many of us are eating foods which fail to provide adequate amounts of certain materials necessary for good nutrition. This was true even before the war when our food supplies were normal

Last year research workers (*2*) reported the results of a survey of the diets of more than a thousand workers in a large aircraft factory. They found that more than four-fifths of the diets studied fell below the amounts of certain nutrients recommended by the Food and Nutrition Board of the National Research Council.

Nutrition specialists who have watched workers select their lunches in cafeteria lines report that not more than half of them choose good lunches, even when foods needed to provide good lunches are on the counters. They also point out that women usually make poorer

choices than men. The effect of such inadequate diets upon the civilian worker, upon his ability to do his part in the war effort, must be of serious concern to us now.

We have also learned that the way food is prepared greatly affects its food value. Studies have been made of foods as they are served to workers. In one such study (*3*) it was learned that as much as 90 percent of the vitamin B_1, which had been in the fresh raw food, was lost before the food was eaten by the worker. Keeping food hot for long periods of time is really overcooking it. The vitamins which are destroyed by heat and oxidation are thus lost.

Studies of this type indicate that we, as a nation, are not as well fed as we once believed. For too long we have judged our state of nutrition by the fullness of our stomachs and by the amount of fat we have stored away, instead of by health, physical fitness, and well-being.

This problem of adequate nutrition is so different from other health problems that it requires a new approach by the health officer. It is vast in its ramifications, involving as it does such diverse problems as crop production programs, farm machinery and manpower, food distribution and rationing, food preservation, processing and transportation, storage and proper food preparation, as well as nutrition education, and the diagnosis, prevention, and treatment of specific dietary deficiency diseases. It is obvious that such problems cannot be solved by any one agency alone. Close cooperation and intimate relations among a number of agencies, of which one certainly should be the health department, are essential.

A number of official and voluntary agencies have been working on certain aspects of the nutrition problem for many years. The home economics and agriculture teachers in our high schools and colleges, the Agricultural Extension Service, the Red Cross, the Children's Bureau of the Department of Labor, and a number of other organizations have been on the nutrition firing line for a long time.

Numerous State health departments have had assistance from the Children's Bureau in establishing and maintaining specialized nutrition services on a State level. A fine start has been made in the maternal and child health divisions where most of the emphasis was rightly placed under normal conditions. Now, however, it is becoming increasingly evident that nutrition work must extend into other divisions of the health department. The war, with its inevitable strain on all of us, with the shortages it creates, the added effort it demands, the population shifts, and the feeding problems in large new war industries, is forcing us to face the nutrition problem on a much larger front and to do something about it. The record of things done up to now is impressive, but we have made only a start.

To deal with such problems the regular nutrition activities of various government and voluntary agencies have been intensified

and expanded. In 1940 representatives of these agencies met and formed a nutrition planning committee. In May 1941, President Roosevelt called the first National Nutrition Conference in Washington (*4*).

The National Nutrition Program grew out of this conference, and was coordinated through the Nutrition Division of the Office of Defense Health and Welfare Services under the direction of Federal Security Administrator Paul V. McNutt. When the Executive order of December 5 was signed, conferring on Secretary Wickard powers concerning the total war food problem of the country, Mr. McNutt immediately recognized that, in order for Federal coordination of nutrition activities to continue properly, the nutrition program must be consolidated with the program developed under this Executive order. He, therefore, very generously offered this going nutrition program to Secretary Wickard, and early in March (1943) the President signed the order transferring the Nutrition Division of the Office of Defense Health and Welfare Services to Secretary Wickard. The program is now part of the recently created War Food Administration under the direction of Mr. Chester Davis.

Regional nutritionists represent the Nutrition Division in the Social Security regions. They are now being transferred to the Food Distribution Administration regions. On invitation these nutritionists work with State and local nutrition committees in planning and developing nutrition programs and projects.

We believe that the most important thing that has been accomplished by this office is the coordination of the nutrition programs of the various Federal agencies, centering attention on the common objective, recognizing that every agency has its part to play, and that no one agency can do it all. Here is a real demonstration of the fact that cooperation among separate agencies can function at the Federal, State, and local levels. It shows that public health, agriculture, labor, relief, and other agencies can do the job together, if they will only try.

In every State in the Union, and in Hawaii, nutrition committees have been formed. In many counties, cities, and local communities nutrition committees are working on local nutrition problems, unfortunately in many instances with little or no participation by the health department. As a result of the work of these committees, nutrition classes have been organized, educational material dealing with local food problems has been prepared, food demonstrations have been given, and many local nutrition problems are being attacked.

One of our most important civilian wartime nutrition problems is the feeding of our industrial workers (*5*). They must be fed

properly if we are to maintain maximum production. The problem outside the plant is part of the community nutrition problem which can be attacked by the local nutrition committee as part of its regular activities. Feeding within the plant is a more specialized problem and requires a different approach. Here it may be regarded as one aspect of a properly developed industrial hygiene program. It should be approached either through the plant medical officer or safety director after the plant management has agreed to the program.

At the Federal level we work very closely with the Industrial Hygiene Division of the National Institute of Health of the United States Public Health Service. At the State level, where State health departments have industrial hygiene officers, it is most important that they be the point of contact with the plant, using the advice and assistance of the local and State nutrition committees. Because of the scope and importance of this industrial nutrition problem we are now appointing regional industrial nutrition representatives to work with State and local committees and health officers on this problem.

In many States with large industrial developments the State nutrition committees have organized special industrial nutrition subcommittees, including in their membership representatives of management, labor, caterers, industrial physicians, public utilities, and other interested groups. The health officer should take his place on these committees.

On request from industrial plants, the industrial nutritionists assist plant executives in planning feeding programs for their employees. Industrial nutritionists also work with labor groups in the promotion of better eating habits among workers.

Nutrition committees throughout the country are working constantly to improve the public knowledge of nutrition and to stimulate the development of better food habits. They are helping war workers, housewives, school children, office workers, and many others to improve their nutrition by improving their food habits. But these committees know that there is much more to be done. They know that each individual must learn for himself what foods are needed for good nutrition and must improve his own nutrition by eating the foods he needs. With shortages of certain foods made inevitable by the war, knowledge of food values and improvement of food habits become doubly important.

Lack of the B vitamins appears to be rather common in the diets of many Americans. Because we have learned to like many refined foods, and because the B vitamins are present in only small amounts in commonly used foods, a plan was developed, with the advice of the National Research Council, to add certain important nutrients to

520065°—43——3

white flour and bread. Because our grain supply is relatively abundant, we can expect a generous supply of flour and other cereal products, and these products are among the most economical in our diet. Even in normal times most people eat bread with every meal. For these reasons, the enrichment of white flour and bread opens the way for considerable improvement in the diet of the Nation. Under the enrichment program, thiamin, niacin, and iron are added to white flour and bread; calcium and vitamin D are optional ingredients, and it is expected that riboflavin will soon be a required ingredient.

The Secretary of Agriculture recently ordered that all pan white bread sold by bakeries must be enriched. Also, it must contain not less than 3 percent nor more than 4 percent of dried milk solids. It is expected that this will be increased to 6 percent, if the milk can be made available. Such a loaf of bread truly becomes a "staff of life" on which we can lean with confidence in the face of restrictions on many customary food items.

This important development is only one way in which efforts are being made to improve our food supply. Some other special foods that are also of importance are vitamin A fortified oleomargarine, iodized salt (which should be used universally), and vitamin D milk for children.

Health departments must do their share not only in nutrition education but also in promoting sound food programs designed to improve nutrition. Public health personnel have both an opportunity and an obligation to perform a function that cannot be performed as well by any other group. We must carry the public health concept of prevention a step further than has been done in the prevention of clear-cut disease. We must strive toward the highest health levels which are possible of attainment. Freedom from obvious disease is not enough. The whole range of health levels, from fatal disease states on one hand to buoyant health on the other, is greatly affected by the food habits of the individual. The prevention of classical disease states has taken so much of our time and thought that often we have failed to recognize a range of degrees of health. While poor nutrition can, and often does, contribute to mortality, optimum nutrition can contribute to that state of health which is even better than average—that extra portion of good health that some individuals have. Nutrition—good or bad—makes its contribution to all grades of health status. Poor nutrition can kill us, while optimum nutrition can make a great contribution to optimum health.

We would not say that good nutrition guarantees good health, but we can say that optimum health is unknown in the absence of good nutrition. Thus nutrition is a fundamental health factor upon which many other factors are conditioned.

The fact that malnutrition rarely appears in our mortality tables and only occasionally in our morbidity tables has not reflected the true importance of nutrition in our national health economy. Hidden hunger frequently has been too elusive and evasive in its manifestations to be caught in our diagnostic drag nets; often it is an accessory to the crime which seldom comes to trial, hiding behind our indifference or ignorance as diagnosticians.

Right now the American public, through necessity, is forced to be food and nutrition conscious. The question, "What am I going to have for my next meal?" formerly suggested diminished financial resources. Now it suggests not so much money shortages as actual food shortages. As intelligent and wide-awake public health officials we must take advantage of this widespread interest to make a great advance in preventive medicine.

Can the American public maintain even its present state of nutrition in the face of the present food situation? This depends upon the efficiency with which we utilize our food supplies. Methods of use, preservation, and preparation of foods, in homes and public eating places are still responsible for tremendous losses in food values. Food waste is still rampant. Even in the face of food shortages, the full garbage pail seems to be far more prevalent than the full dinner pail, nutritionally speaking. The possible uses of alternate foods, when shortages exist, are all too often unappreciated. The signs and symptoms of malnutrition are often attributed to other causes or to vague and ill-defined factors. The relationship of nutrition to other personal health problems is not common knowledge—as it should be.

Right now the American public wants help and guidance in nutrition, and the health department can play a tremendous part in the national effort to improve the nutrition of the population. The health officer and his staff should become acquainted with the nutrition work being done by other agencies. Staff members will find it easier to take their place in local nutrition programs if they have a background of knowledge of work which is being done by other organizations, and if they know, and give full recognition to, the individuals doing that work. Every staff member should recognize the necessity for establishing and maintaining good working relationships with other organizations.

As staff members gain the confidence of, and learn to cooperate with, other agencies, they will find that each can contribute information and help to the others. From such understanding between agencies, effective coordinated programs can grow. Each agency should assume the responsibilities for which it is particularly fitted by work carried on as a part of its regular functioning.

The health department is in a position to help discover and relate nutrition problems to other public health and medical problems.

It should help the public to see nutrition in relation to other factors in the locality which affect the public health.

Public health must find its sphere of activity in nutrition and develop it. This work must not consist simply of individual nutrition guidance spread so thin as to be practically worthless. Neither will random distribution of printed material do the job. We must develop our nutrition activities and services around those procedures which lend themselves to the public health approach.

For many years some Federal, State, and local agencies have been carrying on programs covering certain phases of nutrition. Don't let the public health staff "steal the thunder" of these agencies. If staff members understand that there are many approaches to the nutrition problem, each of which is essential to the development of a complete and effective program, they will appreciate the importance of the nutrition work of agencies whose approaches and contributions differ from their own. They will also see the need for correlating their work with that of other groups, of complementing and supplementing, rather than duplicating, work already done. They will realize that their own program, rather than being curtailed by such cooperative effort, can be made far more effective.

The nutrition program of the health department should have the same seriousness of purpose as the venereal disease, sanitation, and communicable disease programs. It should begin modestly and expand gradually. Planned staff education in nutrition, within the health department or in cooperation with other agencies, should be an integral part of such a program.

What are some of the lines along which State health departments can develop nutrition services which are in keeping with sound principles of public health? Some of the more important activities of such a program might be as follows:

1. Collect information and do appraisals (*6*, *7*) on the incidence and types of deficiency diseases and on food habits in geographical areas and population groups, especially children, pregnant and lactating women, and industrial workers. Even small samplings (*8*, *9*, *10*) are of value in pointing the way to more comprehensive appraisals (*11*).

2. Offer assistance in the diagnosis of nutritional deficiencies. Here is a health department service which is in line with sound public health principles and which will strengthen the work of other agencies in this field. At the same time the efforts of other agencies will contribute greatly to creating a demand for this type of service.

3. Prepare and distribute simple attractive literature dealing with State nutrition problems. Such literature should be prepared with a full knowledge of all other nutrition literature being used by other

agencies in order that duplication and conflicting viewpoints may be avoided.

4. Cooperate actively with other agencies dealing with different aspects of the nutrition problem. Offer the specialized services of the health department to other agencies to help them in dealing with their particular phases of nutrition.

5. Take an active part in the work of the State nutrition committee.

6. Offer information, consultation, guidance, and encouragement to local health departments in developing local nutrition programs and in cooperating with the local nutrition committees.

7. Promote staff education in nutrition, including facilities for professional education in public health nutrition, and education of county and city health department personnel in nutrition activities.

8. Assist in sponsoring conferences and refresher courses in nutrition and related fields for public health and school personnel. During the past three summers nine such cooperatively sponsored 6-week conferences have been held in one State (*10*). Similar projects have been successfully carried out in several other States.

9. Active participation of nutritionists in the public health nursing and dental hygiene program, in well child clinics, in school health programs, and in other activities of the maternal and child health division (*12*).

10. Include nutrition in the industrial hygiene program (*5*) not only by nutrition education in the plant, but also by improving plant feeding facilities and the nutritional quality of the meals served.

11. Cooperate with and assist the State food distribution administrator in locating and meeting local food problems.

12. Take an interest in school lunch programs (*13*, *14*). The United States Public Health Service can consider requests for nutritionists for these programs under Title VI funds if recommended and requested through local and State health departments. Under rationing we should give more attention than ever to the adequacy of the meals our children get at school.

Now, here are some of the things that the local health department can do to help solve the nutrition problems existing in its territory:

1. Learn what other agencies have done and are doing within the area.

2. Affiliate with the local nutrition committee.

3. Study the nutritional status and needs of the area from medical and public health angles and help orient other agencies in this regard (*6*, *7*, *15*).

4. Distribute and interpret nutrition teaching material, especially material which deals primarily with local problems.

5. Have a planned program for staff education in nutrition within the department or in cooperation with other agencies.

6. Exert a stabilizing influence, and interpret sound nutrition practices to the public, avoiding fads and extremes.

7. Interpret local nutritional conditions to the public through talks, newspaper articles, radio programs, etc.

8. Make an effort to increase the interest of local medical and dental professions in local nutrition problems and practical solutions.

9. Develop nutrition educational facilities for patients who attend public health clinics. In some places it may be advisable to establish clinics to deal primarily with nutrition problems.

10. Develop and maintain a movie, film strip, and slide library on nutrition and related subjects.

11. Encourage public eating places to serve food of good nutritional value and to prepare their foods in such a way as to conserve vitamins and minerals. This might be started as a consultation service.

12. Encourage civic clubs to sponsor programs which, either directly or indirectly, will improve the nutrition status of groups within the community.

13. Advise and sponsor feeding facilities in connection with child day care programs.

14. Stress nutrition in school health programs:

a. Cooperate with teachers, P. T. A.'s, and lunchroom managers in improving school lunches.

b. Sponsor cooperative school lunch programs (*13*, *14*).

c. Encourage the use of simple, wholesome, home prepared foods in lunchboxes rather than the use of "store bought" snacks.

d. Watch for and stress nutritional deficiencies in physical examination of school and preschool children (*6*, *16*).

e. When practical, conduct or sponsor demonstrations (*10*) with school children showing results of improved nutrition (properly integrated with other health habits).

f. Sponsor "sampling surveys" of school children for nutritional status. If possible, get local medical and dental societies to cooperate. In one such "survey" (*17*) of a group of rural high school children, 54 percent were found to have spongy gums. Those children with the worst gums agreed to drink two glasses of grapefruit juice each day for a week. This they did at school. At the end of this time 76 percent of the gums had healed or greatly improved. Such easy and simple procedures serve not only as fact-finding devices but create a great deal of interest in local nutrition problems.

Obviously no health department is expected to do everything here suggested but these are examples of ways in which health departments can add their forces to those working to improve the nutritional status of the population. The need is great; the public wants help; the situation demands it. Now is the time for public health to fill the gap

in the lines of those forces which are fighting one of our most dangerous and insidious health enemies—malnutrition.

REFERENCES

(*1*) Johnson, R. E., Darling, R. C., Forbes, W. H., Bronha, L., Egana, E., and Graybiel, A.: The effects of a diet deficient in parts of the vitamin B complex upon men doing manual labor. J. Nutrit., 24: 585 (December 1942).
(*2*) Weihl, Dorothy G.: Diets of a group of aircraft workers in southern California. Milbank Memorial Fund Quarterly, 20: 329 (1942).
(*3*) Goodhart, R.: Dietary conditions in industry. J. Am. Med. Assoc., 121: 93 (January 9, 1943).
(*4*) Proceedings: National Nutrition Conference for Defense, May 1941. Government Printing Office, Washington, D. C., 1942.
(*5*) The food and nutrition of industrial workers in wartime. Report of the Committee on Nutrition in Industry (1942). National Research Council, 2101 Constitution Avenue, Washington, D. C. Free on request.
(*6*) Committee Report: Recognition of early nutritional failure in infants, children, adolescents, and adults. J. Am. Med. Assoc., 118: 615 (February 21, 1942).
(*7*) Nutrition survey of population groups. Report of conference on methods and procedures. Pub. Health Rep., 57: 189 (February 6, 1942).
(*8*) Milam, D. F., and Wilkins, Walter: Plasma vitamin C levels in a group of children before and after dietetic adjustment. Am. J. Trop. Med., 21: 487 (1941).
(*9*) Milam, D. F., and Wilkins, Walter: Vitamin C in normal nutrition: effect of low cost diet on plasma levels over 6-week period. So. Med. and Surg., 104: 191 (April 1942).
(*10*) Wilkins, Walter, and Boyd, French: A nutrition demonstration as a tool for teacher training. J. School Health, 12: 35 (February 1942).
(*11*) Milam, D. F.: Nutrition survey of a small North Carolina community. Am. J. Pub. Health, 32: 406 (April 1942).
(*12*) McHenry, E. W.: Nutrition and child health. Canad. Pub. Health J., 33: 152 (April 1942).
(*13*) Hudson, C. C.: The school lunch as an aid to health education. J. School Health, 10: 84 (March 1940).
(*14*) Willard, W. R.: Working for better nutrition in a rural community. Am. J. Pub. Health, 32: 996 (September 1942).
(*15*) Youmans, J. B.: Nutrition and public health. So. Med. J., 35: 612 (June 1942).
(*16*) Souther, S. P.: Shall public health physicians attempt to assess nutritional status of school children? Am. J. Pub. Health, 32: 166 (February 1942).,
(*17*) Wilkins, Walter, and Boyd, French: Unpublished data.

DEATHS DURING WEEK ENDED MAY 8, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended May 8, 1943	Corresponding week, 1942
Data for 87 large cities of the United States:		
Total deaths	9,051	7,998
Average for 3 prior years	8,139	
Total deaths, first 18 weeks of year	172,795	157,210
Deaths under 1 year of age	598	536
Average for 3 prior years	510	
Deaths under 1 year of age, first 18 weeks of year	11,931	9,933
Data from industrial insurance companies.		
Policies in force	65,513,811	64,975,586
Number of death claims	12,180	11,858
Death claims per 1,000 policies in force, annual rate	9.7	9.5
Death claims per 1,000 policies, first 18 weeks of year, annual rate	10.5	10.1

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 15, 1943

Summary

As compared with the preceding week, current reports show slightly increased incidence of five of the nine common communicable diseases included in the following table (measles, meningococcus meningitis, poliomyelitis, scarlet fever, and whooping cough), and totals reported for both the current week and for the first 19 weeks of the year are above the comparable median figures (1938–42) for these same diseases with the exception of whooping cough.

A total of 485 cases of meningococcus meningitis was reported for the week (exclusive of delayed reports), as compared with 607 for the preceding week and an average of 588 for the past 3 weeks. The decrease was noted throughout the country generally, with the notable exceptions of New Jersey, Michigan, Missouri, and Kentucky, the total for which States aggregated 120 cases as compared with 57 last week. Less significant increases occurred in a few other States. A total of 9,298 cases has been reported to date this year.

The total number of measles cases reported for the current week, 27,776, and the cumulative figure for the first 19 weeks of the year, 368,642, are about 23 percent and 5 percent above the respective median figures.

Poliomyelitis cases reported for the week totaled 28, as compared with 26 last week and a 5-year median of 16. Of the current total, 11 cases were in California, 4 in Mississippi, and 13 in 8 other States.

Of a total of 25 cases of smallpox (as compared with 17 last week and a 5-year median of 48), 15 occurred in Ohio and 6 in Iowa.

The total cases reported to date of the diseases included in the following table, as compared with the same period last year, are as follows (last year's figures in parentheses): Anthrax 26 (29), diphtheria 4,929 (5,255), dysentery, all forms, 5,194 (2,340), infectious encephalitis 211 (150), influenza 71,140 (73,372), leprosy 9 (22),

measles 368,642 (351,766), meningococcus meningitis 9,305 (1,486), poliomyelitis 483 (391), Rocky Mountain spotted fever 56 (64), scarlet fever 75,724 (72,081), smallpox 501 (419), tularemia 316 (346), typhoid and paratyphoid fever 1,083 (1,507), endemic typhus fever 867 (678), whooping cough 76,786 (73,019).

The total number of deaths recorded in 88 large cities of the United States for the current week was 9,176, as compared with 9,273 last week and a 3-year average of 8,178. The accumulated number for the first 19 weeks of the year is 185,655, as compared with 168,764 for the corresponding period of 1942.

520065°–

Telegraphic morbidity reports from State health officers for the week ended May 15, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	May 15, 1943	May 16, 1942		May 15, 1943	May 16, 1942		May 15, 1943	May 16, 1942		May 15, 1943	May 16, 1942	
NEW ENG.												
Maine	0	0	1	------	------	1	34	127	133	2	3	0
New Hampshire	0	0	0	------	------	------	42	38	38	4	1	0
Vermont	0	1	0	------	------	------	251	147	142	0	0	0
Massachusetts	0	7	4	------	------	------	1,669	1,280	848	30	6	1
Rhode Island	2	1	0	1	------	------	52	275	93	12	0	0
Connecticut	0	0	1	3	2	1	491	407	407	4	0	0
MID. ATL.												
New York	16	15	23	[1] 10	[1] 5	[1] 5	3,383	855	2,320	70	14	6
New Jersey	4	3	6	10	3	5	2,329	726	759	42	4	1
Pennsylvania	5	10	20	3	------	------	2,096	1,329	1,329	34	3	4
E. NO. CEN.												
Ohio	19	10	9	8	5	5	519	497	497	• 15	0	1
Indiana	6	1	7	------	1	1	490	219	219	7	1	0
Illinois	32	14	30	26	3	7	1,870	445	445	14	0	2
Michigan [2]	3	4	4	2	0	7	3,782	570	661	24	0	1
Wisconsin	1	0	1	28	5	32	2,320	1,401	1,401	3	1	0
W. NO. CEN.												
Minnesota	0	4	2	------	------	1	379	862	239	3	0	0
Iowa	2	3	2	1	1	3	183	313	260	1	0	0
Missouri	2	4	4	2	------	2	494	251	251	33	3	1
North Dakota	1	1	1	25	9	9	139	17	21	1	0	0
South Dakota	0	4	1	------	------	1	63	89	10	0	0	0
Nebraska	0	1	1	22	27	------	173	402	215	0	0	0
Kansas	0	4	6	------	4	4	542	597	509	7	0	0
SO. ATL.												
Delaware	0	0	0	------	------	------	117	8	9	2	0	0
Maryland [3]	1	3	2	8	3	3	263	423	241	13	5	2
Dist. of Col.	0	0	2	------	------	------	123	106	106	2	4	0
Virginia	2	5	8	141	114	114	326	167	353	19	5	3
West Virginia	2	0	4	1	8	20	159	34	88	9	1	1
North Carolina	6	4	5	8	8	2	280	706	706	18	2	2
South Carolina	15	2	4	39	161	213	127	100	100	1	1	0
Georgia	2	2	4	35	46	46	175	217	217	2	0	0
Florida	3	6	1	12	1	4	136	219	166	9	0	0
E. SO. CEN.												
Kentucky	5	2	5	20	------	8	167	68	120	21	2	3
Tennessee	1	2	2	63	27	35	376	154	154	9	1	2
Alabama	2	4	4	47	20	47	205	143	149	8	0	0
Mississippi [3]	1	6	6	------	------	------	------	------	------	8	1	1
W. SO. CEN.												
Arkansas	2	4	4	8	20	27	98	193	193	[3] 3	2	1
Louisiana	2	7	7	------	2	5	88	223	43	3	4	2
Oklahoma	6	2	5	44	19	40	91	153	178	0	0	0
Texas	22	24	24	267	301	336	432	991	991	15	7	3
MOUNTAIN												
Montana	1	2	2	9	------	4	134	207	57	0	0	0
Idaho	0	1	0	------	1	1	44	156	65	8	0	0
Wyoming	0	0	0	7	64	------	178	93	60	0	0	0
Colorado	7	7	9	25	35	4	583	260	299	3	2	1
New Mexico	0	6	1	8	3	3	23	27	27	0	0	0
Arizona	1	2	1	24	71	55	10	144	73	1	2	0
Utah [2]	0	0	0	34	3	3	252	1,269	293	1	0	0
Nevada	0	0	------	------	------	------	13	4	------	1	0	------
PACIFIC												
Washington	5	1	0	1	------	------	620	547	547	4	4	0
Oregon	0	0	3	65	12	12	237	185	185	5	0	0
California	8	6	16	65	24	42	1,218	4,988	640	17	7	2
Total	187	185	227	1,072	1,008	1,386	27,776	22,632	22,632	[3] 488	86	54
19 weeks	4,929	5,255	6,412	71,140	73,372	143,546	368,642	351,766	351,766	9,305	1,486	941

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended May 15, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	May 15, 1943	May 16, 1942		May 15, 1943	May 16, 1942		May 15, 1943	May 16, 1942		May 15, 1943	May 16, 1942	
NEW ENG.												
Maine	0	0	0	9	4	9	0	0	0	0	1	0
New Hampshire	0	0	0	2	7	6	0	1	0	0	0	0
Vermont	0	0	0	9	12	9	0	0	0	0	1	0
Massachusetts	1	0	0	483	284	191	0	0	0	1	1	1
Rhode Island	0	0	0	35	14	13	0	0	0	0	0	0
Connecticut	0	0	0	99	20	67	0	0	0	0	2	2
MID. ATL.												
New York	0	3	1	619	366	572	0	0	0	9	4	6
New Jersey	0	0	0	154	158	261	0	0	0	0	1	2
Pennsylvania	0	0	0	343	406	402	0	0	0	3	9	7
E. NO. CEN.												
Ohio	2	0	0	125	269	297	15	0	0	1	4	4
Indiana	0	0	0	66	56	82	0	0	1	2	1	2
Illinois	1	0	0	202	128	393	0	0	4	0	2	3
Michigan [2]	0	0	0	134	188	335	1	0	2	1	0	1
Wisconsin	1	1	0	357	112	131	0	0	4	0	2	2
W. NO. CEN.												
Minnesota	0	0	0	49	45	56	0	1	1	2	0	1
Iowa	0	0	0	50	23	61	6	1	13	0	2	2
Missouri	0	0	0	171	58	65	0	3	7	2	2	1
North Dakota	0	0	0	4	5	5	0	0	2	1	0	0
South Dakota	0	0	0	7	12	15	0	0	1	0	0	0
Nebraska	0	0	0	25	26	24	0	0	4	0	0	0
Kansas	0	0	0	78	50	54	0	0	2	2	2	1
SO. ATL.												
Delaware	0	0	0	5	30	7	0	0	0	0	0	0
Maryland [3]	0	1	0	154	54	51	0	0	0	0	2	2
Dist. of Col.	0	0	0	18	6	12	0	0	0	0	0	0
Virginia	0	0	0	38	15	21	0	0	0	2	1	3
West Virginia	0	0	0	26	26	27	1	0	0	0	1	2
North Carolina	0	1	1	16	16	17	1	1	0	1	3	2
South Carolina	0	1	1	8	3	3	0	0	0	1	2	3
Georgia	0	0	0	15	10	10	0	0	0	5	10	5
Florida	0	2	2	3	4	4	0	0	0	1	7	7
E. SO. CEN.												
Kentucky	1	1	0	32	44	48	0	0	0	1	5	4
Tennessee	0	0	0	28	25	55	0	8	2	4	2	3
Alabama	0	2	1	7	8	8	0	1	0	1	0	5
Mississippi [2]	4	0	1	9	0	1	0	1	0	0	4	3
W. SO. CEN.												
Arkansas	2	1	0	12	6	6	0	4	2	1	2	3
Louisiana	0	0	0	1	12	10	0	0	0	5	11	9
Oklahoma	0	0	0	16	2	18	0	2	2	0	2	2
Texas	2	0	1	58	48	37	1	1	2	2	7	9
MOUNTAIN												
Montana	0	0	0	8	16	18	0	0	0	0	0	1
Idaho	0	0	0	90	7	6	0	0	0	1	0	1
Wyoming	0	1	0	55	19	9	0	0	0	0	0	0
Colorado	0	0	0	62	22	34	0	0	3	0	3	2
New Mexico	0	0	0	10	0	6	0	0	0	0	0	0
Arizona	3	0	0	9	4	5	0	0	0	1	0	1
Utah [2]	0	0	0	45	20	20	0	0	0	0	0	0
Nevada	0	0	-----	2	0	-----	0	0	-----	0	0	-----
PACIFIC												
Washington	0	0	0	31	18	25	0	0	1	0	2	2
Oregon	0	0	1	12	13	17	0	0	0	1	0	1
California	11	0	3	166	71	143	0	0	1	3	4	8
Total	28	14	16	3,963	2,742	3,823	25	24	48	54	102	102
19 weeks	483	391	391	75,724	72,081	91,674	501	419	1,380	1,093	1,507	1,560

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended May 15, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Whooping cough: Week ended— May 15, 1943	Whooping cough: Week ended— May 16, 1942	Whooping cough: Median 1938–42	Week ended May 15, 1943: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENG.												
Maine	52	26	28	0	0	0	0	0	0	0	0	0
New Hampshire	13	2	2	0	0	0	0	0	0	0	0	0
Vermont	1	31	35	0	0	0	0	0	0	0	0	0
Massachusetts	151	239	204	0	0	3	0	1	0	0	0	0
Rhode Island	16	36	32	0	0	0	0	0	0	0	0	0
Connecticut	48	100	100	0	0	0	0	1	0	0	0	0
MID. ATL.												
New York	260	437	437	0	10	12	0	2	0	0	0	0
New Jersey	135	313	189	1	0	0	0	0	0	0	0	0
Pennsylvania	280	219	307	0	0	1	0	2	1	0	1	0
E. NO. CEN.												
Ohio	82	189	220	0	0	0	0	1	0	0	0	0
Indiana	83	58	36	0	0	0	0	0	0	0	0	0
Illinois	128	243	132	0	1	0	0	2	0	0	0	0
Michigan [2]	291	187	199	0	0	1	0	0	0	0	0	0
Wisconsin	248	246	138	0	0	0	0	0	0	0	0	0
W. NO. CEN.												
Minnesota	91	48	36	0	1	0	0	0	0	0	0	0
Iowa	59	18	26	0	0	0	0	0	0	0	0	0
Missouri	50	7	34	0	0	6	0	0	0	1	0	0
North Dakota	12	7	11	0	0	1	0	0	0	0	0	0
South Dakota	0	5	5	0	0	0	0	0	0	0	0	0
Nebraska	16	1	7	0	0	0	0	0	0	0	0	0
Kansas	68	42	42	0	0	0	0	1	0	0	0	0
SO. ATL.												
Delaware	2	0	1	0	0	0	0	0	0	0	0	0
Maryland [2]	107	39	70	0	0	0	0	0	0	1	0	0
Dist. of Col.	38	19	19	0	1	0	0	0	0	0	0	0
Virginia	145	55	55	0	0	0	20	0	0	0	0	1
West Virginia	61	1	46	0	0	0	0	0	0	0	0	0
North Carolina	175	100	230	0	0	1	0	0	0	0	1	0
South Carolina	62	56	90	0	0	6	0	0	0	0	1	0
Georgia	60	62	56	0	0	8	4	0	0	0	0	17
Florida	34	12	12	0	0	0	0	0	0	0	0	1
E. SO. CEN.												
Kentucky	13	63	59	0	0	0	0	0	0	0	0	0
Tennessee	78	41	41	0	0	0	1	0	0	1	5	1
Alabama	100	83	51	0	0	0	0	0	0	0	1	11
Mississippi [2]	------	------	------	0	0	0	0	0	0	0	0	0
W. SO. CEN.												
Arkansas	44	9	21	0	0	0	0	0	0	0	4	0
Louisiana	2	8	31	0	1	0	0	0	0	0	0	4
Oklahoma	33	8	14	0	0	0	0	0	0	0	0	0
Texas	494	136	270	------	15	210	0	0	0	0	3	15
MOUNTAIN												
Montana	25	14	14	0	0	0	0	0	0	2	2	0
Idaho	2	10	10	0	0	0	0	1	0	5	0	0
Wyoming	5	8	6	0	0	0	0	0	0	0	0	0
Colorado	21	27	40	0	0	0	0	0	0	0	2	0
New Mexico	18	14	23	0	0	0	1	0	0	1	2	0
Arizona	9	36	28	0	0	0	7	0	0	0	0	0
Utah [2]	0	32	60	0	0	0	0	0	0	2	2	0
Nevada	3	10	------	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	35	75	75	0	0	0	0	0	0	0	0	0
Oregon	52	21	21	0	0	0	0	0	0	1	0	0
California	431	265	366	0	3	17	0	0	0	2	1	0
Total	4,133	3,658	3,820	1	32	266	33	11	1	16	25	50
19 weeks	76,786	73,019	76,445	26	560	3,761	873	211	9	56	316	867
19 weeks, 1942	------	------	------	29	325	1,269	746	150	22	64	346	678

[1] New York City only. [2] Period ended earlier than Saturday.
[3] Delayed report of 3 cases in Arkansas for week ended May 8, 1943, included.

WEEKLY REPORTS FROM CITIES

City reports for week ended May 1, 1943

This table lists the reports from 89 cities of more than 10,000 population distributed throughout the United States and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	1	0	12	1	0	0	3	0	0	14
New Hampshire:												
Concord	0	0		0	1	0	0	0	1	0	0	0
Vermont:												
Barre	0	0		0	2	0	0	0	0	0	0	0
Massachusetts:												
Boston	0	0		2	223	19	17	0	161	0	0	27
Fall River	0	0		0	181	0	1	0	3	0	0	13
Springfield	0	0		0	11	0	1	0	54	0	0	6
Worcester	0	0		0	223	0	12	0	9	0	0	2
Rhode Island:												
Providence	0	0		0	2	4	5	0	23	0	0	19
Connecticut:												
Bridgeport	0	0		0	0	0	2	0	4	0	0	0
Hartford	1	0		0	34	1	5	0	4	0	0	3
New Haven	0	0	1	0	18	2	3	0	5	0	0	4
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0		2	71	2	12	0	15	0	0	8
New York	19	0	8	4	1,106	52	94	3	417	0	3	53
Rochester	0	0		0	45	0	5	0	6	0	0	5
Syracuse	0	0		0	84	1	5	0	7	0	0	16
New Jersey:												
Camden	1	0		2	15	1	0	0	7	0	0	1
Newark	0	0	6	0	370	5	12	0	6	0	1	32
Trenton	0	0	2	0	36	1	5	0	8	0	0	1
Pennsylvania:												
Philadelphia	3	0	2	1	278	19	30	0	109	0	0	55
Pittsburgh	0	0	2	3	40	3	13	0	11	0	0	69
Reading	0	0		1	109	1	0	0	1	0	0	6
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0		0	92	4	6	0	42	0	0	4
Cleveland	2	0	11	0	22	1	13	0	45	1	0	32
Columbus	0	0	1	1	43	1	1	0	15	0	0	3
Indiana:												
Fort Wayne	0	0		1	17	0	5	0	10	0	0	0
Indianapolis	2	0		1	194	0	6	0	19	0	0	24
South Bend	0	0		0	6	0	0	0	0	0	0	0
Terre Haute	0	0		0	13	0	0	0	0	0	0	0
Illinois:												
Chicago	25	0	4	2	963	13	26	0	91	0	0	49
Springfield	0	0		0	10	1	1	0	0	0	0	7
Michigan:												
Detroit	7	0		0	1419	19	19	0	39	0	1	97
Flint	0	0		0	151	0	5	0	4	0	0	6
Grand Rapids	0	0		0	10	1	3	0	5	0	0	12
Wisconsin:												
Kenosha	0	0		0	4	0	0	0	11	0	0	0
Milwaukee	0	0	1	1	449	1	6	0	148	0	0	35
Racine	0	0		0	5	0	0	0	25	0	0	0
Superior	0	0		0	3	0	0	1	0	0	0	1
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0		0	5	0	4	0	2	0	0	3
Minneapolis	0	0		0	187	3	4	0	22	0	0	21
St. Paul	0	0		1	15	1	3	0	5	0	0	34
Missouri:												
Kansas City	0	0		2	85	1	4	0	38	0	0	1
St. Joseph	0	0		0	7	0	4	0	0	0	0	1
St. Louis	0	0	2	1	52	16	16	0	15	0	1	20

City reports for week ended May 1, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENT.—con.												
North Dakota:												
Fargo	0	0		0	0	0	0	0	0	0	0	0
Nebraska:												
Omaha	1	0		0	9	0	3	0	8	0	0	2
Kansas:												
Wichita	0	0		0	148	0	2	0	0	0	0	7
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0		0	23	8	2	0	3	0	0	0
Maryland:												
Baltimore	5	0	5	1	170	12	12	0	47	0	1	98
Cumberland	0	0		0	0	0	0	0	0	0	0	0
Frederick	0	0		0	2	0	0	0	0	0	0	0
District of Columbia:												
Washington	0	0	1	2	0	5	5	0	20	0	0	33
Virginia:												
Lynchburg	0	0		0	4	1	1	0	4	0	0	8
Richmond	0	0		2	12	2	3	0	4	0	0	2
Roanoke	0	0		0	0	0	0	0	0	0	0	0
West Virginia:												
Charleston	1	0		0	0	0	0	0	1	0	0	1
Wheeling	0	0		0	56	0	1	0	0	0	0	6
North Carolina:												
Raleigh	0	0		0	16	0	0	0	0	0	0	0
Wilmington	0	0		1	4	0	0	0	1	0	0	8
Winston-Salem	0	0		0	1	0	3	0	0	0	0	9
South Carolina:												
Charleston	0	0	2	0	2	0	1	0	0	0	0	1
Georgia:												
Atlanta	0	0	7	0	7	0	2	0	1	0	0	2
Brunswick	0	0		0	2	0	1	0	0	0	0	0
Savannah	0	0	1	0	3	0	0	0	0	0	0	2
Florida:												
Tampa	0	0		0	3	0	1	0	0	0	0	3
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	1	0	164	1	3	0	3	0	0	18
Nashville	0	0		2	12	0	3	0	0	0	0	1
Alabama:												
Birmingham	1	0	8	0	23	2	4	0	0	0	0	2
Mobile	1	0		2	2	0	1	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0		0	14	0	2	0	0	0	0	0
Louisiana:												
New Orleans	1	0		0	0	2	13	0	8	0	1	5
Shreveport	0	0		0	0	0	3	0	0	0	0	0
Texas:												
Dallas	2	0		0	4	1	2	1	1	0	0	12
Galveston	1	0		0	7	0	1	0	0	0	0	3
Houston	0	0		0	4	0	9	0	3	0	1	6
San Antonio	0	0		0	1	1	3	0	1	0	0	0
MOUNTAIN												
Montana:												
Billings	2	0		0	10	0	2	0	1	0	0	1
Great Falls	0	0		0	48	0	1	0	0	0	0	3
Helena	0	0		0	22	0	0	0	0	0	0	0
Missoula	0	0		0	34	0	1	0	0	0	0	0
Idaho:												
Boise	0	0		0	0	0	0	0	9	0	0	0

City reports for week ended May 1, 1943—Continued

	Diphtheria cases	Encephalitis, in fectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
MOUNTAIN—continued												
Colorado:												
Denver	1	0	8	2	377	0	4	0	10	0	1	3
Pueblo	0	0	------	0	9	1	0	0	1	0	0	16
Utah:												
Salt Lake City	0	0	------	1	60	0	1	0	5	0	0	39
PACIFIC												
Washington:												
Seattle	2	0	------	0	164	1	5	0	4	0	0	19
Spokane	0	0	----	0	52	3	0	0	0	0	0	2
Tacoma	0	0	----	0	12	0	0	0	1	0	0	0
California:												
Los Angeles	4	0	12	3	177	1	2	1	16	0	0	66
Sacramento	2	0	------	0	13	1	5	0	0	0	0	3
San Francisco	0	0	-----	0	109	10	18	0	17	0	1	29
Total	84	0	86	41	8,393	221	468	6	1,559	1	11	1,088
Corresponding week, 1942	46	4	67	24	6,463	40	376	2	1,400	3	18	1,432
Average, 1938-42	77	-----	128	[1] 30[2]	6,423	---	[1] 388	------	1,571	10	19	1,198

[1] 3-year average, 1940–42
[2] 5-year median.
Dysentery, amebic.—Boston, 1; New York, 5.
Dysentery, bacillary.—New York, 4, Charleston, S. C., 8; Los Angeles, 1.
Dysentery, unspecified.—San Antonio, 9.
Typhus fever.—Birmingham, 1; New Orleans, 2.

Rates (annual basis) per 100,000 population, by geographic groups, for the 89 cities in the preceding table (estimated population, 1942, 34,707,700)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	2.5	0.0	5.0	5.0	1,757	67.1	114.3	0.0	663	0.0	0.0	204
Middle Atlantic	10.3	0.0	8.9	5.8	961	37.9	78.5	1.3	262	0.0	1.8	110
East North Central	21.0	0.0	9.9	3.5	1,986	23.9	53.1	0.6	265	0.6	0.6	158
West North Central	2.0	0.0	4.0	8.0	1,015	42.0	80.0	0.0	180	0.0	2.0	178
South Atlantic	10.1	0.0	27.0	10.1	514	38.8	54.0	0.0	137	0.0	1.7	292
East South Central	11.9	0.0	53.5	23.8	1,194	17.8	65.3	0.0	18	0.0	0.0	125
West South Central	11.7	0.0	------	0.0	88	11.7	96.8	2.9	38	0.0	5.9	76
Mountain	24.1	0.0	64.3	24.1	4,502	8.0	72.4	0.0	209	0.0	8.0	498
Pacific	14.0	0.0	21.0	5.2	921	28.0	52.4	1.7	66	0.0	1.7	208
Total	12.6	0.0	12.9	6.2	1,261	33.2	70.3	0.9	234	0.2	1.7	163

PLAGUE INFECTION IN OAKLAND, CALIF., AND TACOMA, WASH.

Plague infection has been reported in Oakland, Calif., and Tacoma, Wash., as follows:

CALIFORNIA

Alameda County—Oakland: In the spleen of a rat trapped on March 10 at No. 704 Jefferson Street, Oakland, Calif.

WASHINGTON

Pierce County—Tacoma: In pools of fleas and tissue from rats, *R. norvegicus*, taken from frame buildings in industrial sections of Tacoma, Wash., as follows: April 22, in a pool of 150 fleas from 34 rats and in tissue from 1 rat; April 23, in a pool of 50 fleas from 33 rats.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (human).—On May 3, 1943, 1 death from bubonic plague in a 14-year-old male was reported in Honokaa, Hamakua District, Island of Hawaii, T. H. This is the fourth death from plague reported in Hamakua District since March 1, 1943.

Plague (rodent).—During the week ended April 17, 1943, 3 rats proved positive for plague were reported in Hamakua District, Island of Hawaii, T. H., as follows: 1 rat in Honokaa, 1 in Kapulena, and 1 in Paauhau.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended April 17, 1943.—During the week ended April 17, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	1	17		125	267	33	33	22	36	534
Diphtheria		11	1	15	2	8			1	38
Dysentery (amebic)						1				1
Dysentery (bacillary)				4						4
Encephalitis, infectious								1		1
German measles		4		20	152	2	3	23	5	209
Influenza		21	1		157	2	2		126	309
Measles	1	144		360	1,556	105	190	155	235	2,746
Meningitis, meningococcus	2	1	2	4		1			1	11
Mumps	1	111	2	60	1,275	108	110	85	129	1,881
Scarlet fever		18	17	90	353	42	45	29	8	602
Tuberculosis	4	15	9	104	66	15		17	21	251
Typhoid and paratyphoid fever	2			30	2		1			35
Undulant fever				2	1				2	5
Whooping cough		1	1	78	208	59	27	30	51	455

CHILE

Santiago—Cerebrospinal meningitis.—For the 4 weeks ended January 23, 1943, 57 cases of cerebrospinal meningitis with 17 deaths were reported in Santiago, Chile.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Peru—Libertad Department—Trujillo.—During the month of March 1943, 3 cases of plague with 2 deaths were reported in Trujillo, Libertad Department, Peru.

Smallpox

Algeria.—For the period April 1–10, 1943, 42 cases of smallpox were reported in Algeria, including 13 cases reported in Algiers and 3 in Cheliff.

Indochina.—For the period March 11–31, 1943, 880 cases of smallpox were reported in Indochina, including 45 cases in Annam, 128 in Cambodia, 409 in Cochinchina, and 298 in Tonkin.

Spain.—For the 2 weeks ended March 13, 1943, 12 cases of smallpox were reported in Spain.

Typhus Fever

Algeria.—For the period April 1–10, 1943, 478 cases of typhus fever were reported in Algeria, including 23 cases in Algiers, 33 in Bone, 55 in Oran, and 10 in Mostaganem.

Hungary.—For the period April 11–17, 1943, 39 cases of typhus fever were reported in Hungary.

Mexico—Mexico, D. F.—Typhus fever has been reported in Mexico, D. F., Mexico, as follows: Weeks ended—February 6, 43 cases, 6 deaths; February 13, 60 cases, 8 deaths; February 20, 49 cases, 12 deaths; February 27, 44 cases, 12 deaths.

Rumania.—For the period April 16–30, 1943, 486 cases of typhus fever (including 21 cases in Bucharest) were reported in Rumania.

Slovakia.—For the period March 21–April 10, 1943, 60 cases of typhus fever were reported in Slovakia.

Spain.—For the 2 weeks ended March 13, 1943, 22 cases of typhus fever were reported in Spain.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 58 MAY 28, 1943 NUMBER 22

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol. 58 • MAY 28, 1943 • *No. 22*

A PLAN FOR RODENT CONTROL IN CITIES

By G. C. SHERRARD, *Senior Surgeon (R), United States Public Health Service*

Nearly every health officer has felt the urge, either upon his own initiative or upon the solicitation of citizens, to engage in a campaign of rat extermination. Very often such an effort follows the familiar pattern of trapping and poisoning, with publicity setting forth the destructive proclivities and disease dissemination possibilities of rodents. After a brief flurry such a campaign usually subsides quickly, with dubious or negligible accomplishments. A rat campaign based upon a misconception of the factors involved may be termed a futile public health effort.

While the important role played by rats and their ectoparasites in the transmission of disease is widely recognized by public health officials, the methods which may be utilized for the effective control of these pests on a city-wide scale appear to be less well known. If results are to be achieved in proportion to the efforts and expenditure made, careful planning of the entire program is necessary.

Designed especially for cities, the plan here outlined may readily be adjusted to existing conditions. Obviously the extent and direction of the program will depend upon size, location, and environment. Furthermore, the financial status of the city, as well as the availability of personnel and equipment, will largely influence the results.

The various administrative steps, procedures, and activities designed to promote a successful rodent control campaign in cities may be summarized as follows:

1. Trained leadership.
2. Office space and equipment.
3. Field equipment.
4. Records.
5. Survey of actual and potential harborages.
6. Trapping.
7. Identification and classification of rodents and their ectoparasites.
8. Ratproofing ordinance.
9. Cooperation with other city departments and agencies.
10. Education and publicity.
11. Enforcement of provisions of ratproofing ordinance.
12. Permanent control measures.

The logic of the measures herein described is predicated on the fact that in large centers of population rats are dependent upon man for the two absolute necessities of life, food and shelter. Of these two essentials to rat life it is most difficult and often impracticable to prevent access to food. However, measures for the removal of food beyond the reach of rats are of utmost importance in controlling the rat population.

Rat control of enduring character cannot be accomplished without the elimination of active and potential harborages. Therefore, an effective program should be based on the principle of permanent harborage elimination. All other measures are either palliative or accessory.

As a guide to those contemplating the inauguration of a rodent control program a brief description is given of various phases of such a project.

Trained leadership.—To insure the success of a plan of rodent control it is essential that the work be supervised by a thoroughly trained person. This person should have teaching and executive abilities and should be capable of assuming charge of personnel and all field activities. When trained personnel are not available, arrangements should be made to have a suitable member of the health department staff trained in a large city where effective rodent control measures are actively pursued. The United States Public Health Service may be consulted in such matters; it stands ready to give information and assistance in planning a course of instruction. A minimum period of 90 days should be allotted for the necessary training.

Office space and equipment.—Very little office space and equipment are needed in order to conduct a rodent-control program. A desk, telephone, typewriter, and a large and a small filing cabinet are essential. As the work progresses additional space and equipment can usually be acquired.

Field equipment.—Transportation is the most important item of field equipment. A light automobile with a pick-up body is ideal for the transportation of sanitary inspectors, the distribution of supplies, and the delivery of rats to the laboratory or incinerator.

Records.—The recording of data can be accomplished by the use of three separate forms designed for the following purposes:

(*a*) Field form.—This form should be designed to record detailed rat infestation and ratproofing data relating to the individual building and premises inspected and should be completed in the field. Provision should be made for the inclusion of all recommended corrective measures.

(*b*) Office form.—This form is designed for the recording of pertinent statistical data obtained from field reports and for a ready reference file.

(*c*) Laboratory forms.—When laboratory investigations are to be conducted in conjunction with rodent control activities, a field card similar to an ordinary

shipping tag may be used for recording the time, number, district, place, and means by which such rodents were obtained.

(*d*) The recording of laboratory data relative to rodents and their ectoparasites should be accomplished by the use of a separate identifying serial number for each premise from which rodents are recovered. The serial number given the rodents and ectoparasites should correspond with the serial number given the premises. Districts may be designated by letters, and subdivisions of a district by numerals. For example, District A, A1, District B, B1, etc.

Survey of actual and potential harborages.—For survey purposes a large map of the city should be obtained and districts outlined according to general types and uses of buildings, i. e., residential, retail, wholesale, manufacturing, warehouse, market, waterfront, etc. Dumps existing within the city or in close proximity thereto for the disposal of waste should be placed in a separate district. For descriptive purpose those districts embracing types of buildings, such as residential, which are widely scattered or cover a comparatively large geographical area may be further subdivided into smaller geographical units.

A number of typical buildings, including outbuildings and grounds, in each district should be inspected in order to determine existing conditions as to ratproofing and rodent infestation. The following points should be noted and recorded during this survey:

(*a*) Type of building—whether wood, brick, cement, stone, etc.

(*b*) Presence or absence of a basement.

(*c*) Presence or absence of rat infestation and harborages. When infestation and harborage are found, the location and extent should be noted, together with an estimation of the probable number of rodents present.

(*d*) Presence of potential or used rat runs.

(*e*) Presence and accessibility of food attractive to rats, either within the building or on the premises.

(*f*) Trash or rubbish which might afford harborage for rodents.

(*g*) Ground burrows.

(*h*) Method of garbage disposal, whether buried or stored in ratproof containers.

(*i*) General condition of the buildings as to their state of repair.

Trapping.—When a determination of the species and index of ectoparasites is desired, live rats should be trapped in each district by means of cage or small steel traps. For general trapping, however, the best results are obtained by the use of baited wooden snap traps indoors and steel traps in the open. Trapping should be done systematically by districts in order to secure representative specimens from all parts of the city. All traps should be visited daily, baiting and resetting in new locations as indicated. Trapped live rats in their cages should be delivered daily to a central laboratory for examination, classification, and recovery of ectoparasites.

Rats caught alive in steel traps may be killed on the spot and put in white cotton bags for transportation to the laboratory. Dead rats should be delivered to the laboratory when necessary to examine them

for specific diseases or other purposes. All rats should be disposed of by incineration.

The recovery and classification of ectoparasites is of considerable importance from a public health standpoint, as it affords a means of determining the potential susceptibility of a municipality to rat-borne endemic and epidemic diseases.

The collection of ectoparasites.—In order to determine the prevalence and species of ectoparasites infesting live rats, it is necessary to devise a procedure which will prevent the escape and permit the recovery of all the ectoparasites infesting the rat at the time of death. Various procedures have been employed. The choice will depend on available facilities and the advisability of animal inoculation to determine the presence of endemic or epidemic disease in rats. Where animal inoculation of pooled parasites is to be done, the lethal agent should be a gas with little or no bactericidal properties. In an article published in 1939, Eskey and Haas (*13*) report that tests show that hydrocyanic acid gas caused only slight and variable reduction in the virulence of cultures of *P. pestis*, while chloroform in saturated atmospheres was capable of destroying the organisms. When animal inoculation is not planned, the following procedure will be found satisfactory: Upon delivery to the laboratory live rats should be killed either by crushing their necks with heavy forceps or by administration of chloroform. When chloroform is used the rats should be anesthetized in a glass or white enamel container in order that ectoparasites leaving the body during the process may be seen and recovered. In the case of rats caught in steel traps and killed at the place of capture, the bodies and containers should be brought to the laboratory where they may be subjected to a gaseous insecticide and the parasites recovered in the same manner as previously described. The inner surface of the containers should be carefully searched for parasites which may have left the body. When live rats are killed by means of forceps, the bodies should be immediately suspended by the tail over a large white enameled pan containing water. This may be accomplished by the use of heavy spring paper clips attached to a wire strung over the pan at a height which permits the rat's nose barely to clear the water. Within a period of 2 hours a large percentage of the infesting fleas will leave the cooling body and jump into the water, from which they may be easily recovered. Remaining fleas may be dislodged and recovered by combing the suspended body. Other ectoparasites, such as mites and lice, may be recovered by combing the fur over a large sheet of white paper. By stroking with a fine steel comb against the direction of the hair the ectoparasites may be seen and removed. This method must also be used to recover fleas from rats killed by chloroform. All ectoparasites should be preserved in vials contain-

ing 50 percent alcohol for future classification. Vials should be identified with the district number and the same serial number given to the rodents from which the ectoparasites were recovered.

Identification and classification of rodents.—Rodents should be classified and identified as to species. The prevalent species for the locality can readily be identified by a laboratory attendant after a brief period of training, while the unusual specimen may be preserved for examination by a more competent authority. The sex, approximate age, pregnancy, and pathology found at post mortem should also be recorded.

Enactment of a ratproofing ordinance.—This procedure usually requires a considerable period of time and necessitates consultations by the city health officer with various members of the city council and administrative officials. Whether the ordinance is to be enacted as a part of the sanitary or building code will be determined by local circumstances. Violations of the code should be made a responsibility of the health department. Whatever the type of ratproofing ordinance enacted, it should contain the following basic provisions:

(*a*) Provision for the ratproof construction of all new buildings erected after the date the ordinance becomes effective.

(*b*) Provision for the ratproofing of existing buildings and their equipment when used commercially for the purpose of manufacturing, processing, distributing, or storing foods, food products, or wastes, either in bulk or nonratproof containers.

(*c*) Provision for the control of rats on public and private dumps and premises.

(*d*) Provision for the proper storage of garbage in ratproof containers and its disposal in such a manner as not to attract rats.

A model ratproofing ordinance is contained in Supplement 131 to the PUBLIC HEALTH REPORTS, a copy of which may be secured by addressing The Surgeon General, United States Public Health Service, Bethesda, Md.

Cooperation with other city departments and agencies.—The progress of a rat control program is made much easier by close cooperation with the fire, police, building, sanitary, and other city departments or agencies which are in any way concerned with the construction, maintenance, or servicing of buildings or their contents. Representatives of these organizations are in a position to obtain and relay information concerning rat infestation. When properly informed they are capable of acting as advance agents in distributing information on the value of ratproofing.

Education and publicity.—The dissemination of information concerning the purpose, value, and methods of rat control is an important part of an effective program. The assistance which can be secured from city and civic organizations through the medium of talks and conferences will materially lighten the work of the health department in this respect. Contacts should be made with builders, contractors, and architects in order to explain the purpose and ad-

vantage of ratproofing new buildings. The cheapest and best way to ratproof a building is to include ratproof specifications in the construction plans.

Spectacular publicity campaigns are undesirable and seldom produce permanent results. The publication, in the health section of local newspapers, of interesting facts relating to rats, together with the reasons and methods for their control, is a valuable educational procedure. Pamphlets containing similar information may be prepared for distribution to schools, civic and other organizations. Patience and perseverance are the keynotes in bringing to the attention of the public the need for protection against property damage and health hazards caused by rats.

School authorities should be consulted about incorporating facts concerning the history, habits, characteristics, economic and health hazards of rats in appropriate courses, such as environmental hygiene or related subjects.

Exhibits at State and county fairs provide an excellent means of disseminating information concerning rat control. By means of specimens, views, models, and drawings such exhibits impress onlookers with the economic damage inflicted and the health hazards ascribed to rats. The more common types of rat harborages and the methods used for their elimination should be demonstrated. The main theme of the exhibit might appropriately be captioned, "No rat home, no rat food: no rats."

At the 1942 Minnesota State Fair an exhibit on rat control prepared and staged by the Minnesota State Department of Health, in cooperation with the department of health of Minneapolis, was viewed with interest by 22,000 persons during a 10-day period. A moving picture film on the subject of rat control was shown to approximately 13,000 people.

Enforcement of the ratproofing code.—Every effort should be made to promote ratproofing through cooperation, education, and demonstrations. The cost of ratproofing new buildings under construction is so small that it requires no particular financial consideration. On the other hand, the cost of ratproofing old buildings may present an important economic problem, the solution of which requires good judgment coupled with justice and reason. A health department which obtains the confidence of the public and builds a favorable reputation through the wise and just administration of ratproof laws and procedures is much more likely to achieve success than would be the case were compliance too frequently made mandatory through legal action.

When it becomes necessary or advisable to test the legality of a ratproof code in the courts, the test case should be chosen with care. In the case of existing buildings the evidence of marked rat infestation

should be carefully verified and the practicability of the corrective procedures plainly outlined. A store or market used for the purpose of distributing bulk foods to the public offers the best chance for a successful test.

Permanent control procedures.—Having gained, by means of the preliminary survey, information as to existing rat harborages and infestation, active permanent control measures may be inaugurated.

Conferences should then be held with owners, agents, or operators of infested buildings. The sanitary, health, fire, and trade hazards resulting from rat infestation should be pointed out and the remedies plainly indicated. Permanent control procedures, in order of importance, are as follows:

(*a*) Ratproofing of all new buildings during the period of construction.

(*b*) Ratproofing of existing buildings and fixtures found to be infested. The consent and cooperation of owners or operators should be obtained for the ratproofing of a few especially chosen, heavily rat infested buildings for demonstration purposes. A record of the costs should be kept and care exercised that such costs are kept within reasonable bounds as related to the building and business investment. The successful outcome of these demonstrations will furnish references and publicity which will be invaluable in continuing the work and obtaining future cooperation in ratproofing procedures.

(*c*) Elimination of accumulated waste material. Waste material such as boxes, barrels, packing, sacks, etc., should be removed both from the buildings and premises.

(*d*) Storage of goods. All goods and supplies should be properly stored in a neat and orderly manner in small units and elevated from the floor. This arrangement promotes more complete visibility, prevents rats from securing an undisturbed nesting place, and makes detection easier.

(*e*) Trapping. This is of permanent value only in connection with ratproofing. Flat double action snap traps are best for inside use and the ordinary steel traps for outside use.

(*f*) Fumigation. This is an emergency measure which is highly effective in securing a large and immediate reduction of the rat population in restricted areas. It should be applied in all cases where buildings or premises are infected or suspected of being infected with rat-borne disease. Following fumigation enduring rat control measures such as harborage elimination, protective ratproofing, and sanitation should be inaugurated. As fumigants which are lethal to rats are also lethal to man, the procedure should be undertaken only by experienced public health officials or licensed pest control operators.

(*g*) Poisoning. This method of destroying rats should be restricted to those instances where the existence of rat-borne disease necessitates the application of all possible emergency measures. The longer this procedure is applied the less effective it becomes.

SUMMARY

Rodent control, like other important public health measures, requires foresighted planning if expectations are to be realized. The solution of the problem will be found in the continuous application of control measures rather than in evanescent campaigns. Preconceived ideas concerning results to be obtained by poisoning and trapping of

rats must be discarded in favor of the slower and more difficult method of "building them out," i. e., ratproofing. At the same time food supplies must be made inaccessible, thereby serving the double purpose of depriving rodents of sustenance and conserving commodities vitally needed for human consumption.

Special emphasis has been placed on ratproofing and harborage elimination for the reason that this plan is designed for use in cities where the objective is to secure economical and enduring control of rats as a preventive measure. Where plague or typhus exists, or is suspected in either human or rodent form, more vigorous action is indicated. Under these circumstances emergency measures such as fumigation, trapping, and poisoning should be promptly undertaken and continued as long as laboratory examinations indicate the presence of infection.

The plan outlined, with modifications adapted to local requirements and conditions, has produced satisfactory results in the past and, in the hands of conscientious administrators, will continue to do so in the future.

ACKNOWLEDGMENTS

The cooperation of Medical Directors Robert Olesen and C. L. Williams in the editing and preparation of this manuscript is gratefully acknowledged.

REFERENCES

For the benefit of those desiring more detailed information on this subject the following references will be found of value:

(1) Boston, R. J.: Public health engineering phases of murine typhus control. Am. J. Pub. Health, 30: 619-626 (June 1940).
(2) Boston, R. J.: Advances in methods of murine typhus control. Am. J. Pub. Health, 31: 720-727 (July 1941).
(3) Holsendorf, B. E.: Rat harborage and ratproofing. Pub. Health Rep., 52: 75-81 (Jan. 15, 1937). Reprint No. 1798.
(4) Silver, James, Crouch, W. E., and Betts, M. C.: Ratproofing buildings and premises. U. S. Dept. of Agric., Farmers' Bull. No. 1638. U. S. Government Printing Office, 1930.
(5) Holsendorf, B. E.: The rat and ratproof construction of buildings. Supplement 131 to the Public Health Reports. U. S. Government Printing Office, 1937.
(6) Heiser, V. G.: Relative efficiency of rat traps. Pub. Health Rep., 29: 341-342 (Feb. 6, 1914). Reprint No. 167.
(7) Long, J. D.: Choice of rat poison in antiplague work. Pub. Health Rep., 51: 551-554 (May 1, 1936).
(8) Moore, Roy: Rodent control in food establishments. Am. J. Pub. Health, 27: 62-66 (January 1937).
(9) Silver, James: Rat control. U. S. Dept. of Agric., Farmers' Bull. No. 1533. U. S. Government Printing Office, 1933.
(10) The rat: A health menace that should be eradicated. Pub. Health Rep., 43: 2157-2159 (Aug. 17, 1928).
(11) The rat: Arguments for its elimination and methods for its destruction. Pub. Health Bull. No. 180. U. S. Government Printing Office, 1928.
(12) Rats responsible for infection. Pub. Health Rep., 42: 1112 (Apr. 22, 1927).
(13) Eskey, C. R., and Haas, V. H.: Plague in the western part of the United States. Pub. Health Rep., 54: 1467-1481 (Aug. 11, 1939).
(14) Eskey, C. R.: Flea infestation of domestic rats in San Francisco, Calif. Pub. Health Rep., 53: 948-951 (June 10, 1938).

THE BACTERIOSTATIC ACTION OF SULFADIAZINE ON *E. TYPHOSA* IN CARRIERS AND CASES[1]

By ALBERT V. HARDY, *Surgeon (R), United States Public Health Service*

The favorable results of sulfonamide therapy in *Shigella dysenteriae* infections encouraged us to extend our observations to typhoid fever. Watt and Peterson (*1*) have reported that they found sulfaguanidine noneffective in the treatment of cases and carriers. The response to sulfadiazine is considered here.

Techniques.—Two quantitative tests, designed to measure relatively the number of viable *Eberthella typhosa* in the lower enteric tract and in the feces, were used. In one test fecal specimens were obtained by rectal swabs and were inoculated to S. S. (Shigella-Salmonella) agar in a uniform manner. After incubation the suspicious clear colonies were counted. Four such colonies were picked from each plate for identification. If at least three proved to be *E. typhosa,* and if the suspicious colonies appeared to be of one type, the count was accepted as a relative measure of the number of viable *E. typhosa* in the lower enteric tract. In the other test passed fecal specimens, collected in glycerine saline preservative, were mixed with saline to give a heavy suspension which was adjusted approximately by turbidity. Tenfold dilutions of each specimen were prepared from 1:10 to 1:100,000. One cubic centimeter of the original suspension and 1 cc. of each dilution were inoculated to pour plates of bismuth sulfite agar (Wilson Blair medium). Only two plates with low dilutions and one with a high dilution were used when preceding tests revealed few or no organisms. After 48 hours suspicious colonies were counted and fished. If all or almost all of the fished colonies proved to be *E. typhosa,* the number per cubic centimeter of the heavy suspension was calculated.

A third nonquantitative cultural procedure was employed. The rectal swabs, after being used for inoculating plates, were dropped into tubes containing selenite F enrichment. Following incubation, the swabs were again used for plating to S. S. agar. A portion of the plate was heavily inoculated and the remainder was lightly streaked from this, using a needle with a ball tip.

Para-amino benzoic acid, 5 mg. percent, was added to the medium which was used for cultures in the case of individuals receiving sulfadiazine.

Routinely we sought to obtain three pretreatment cultures from carriers and two from cases of typhoid fever. During medication and for 1 week thereafter cultures were taken daily. This prescribed procedure could be followed in most cases.

[1] From the Division of Infectious Diseases, National Institute of Health.

Observations on chronic carriers.—The carriers studied were inmates of New York State mental hospitals.[2] They are listed by sex and age in table 1. All but 2 were females and all but 3 were above 50 years of age. The 19 carriers available for treatment included 15 found to be excreting many organisms. There were 389 positive reports among the 428 fecal cultures which had been performed prior to this study. Eosin-methylene blue agar had been used in culturing specimens from 2 individuals who had 21 of the 39 reported negative examinations.

The pretreatment cultures on the carriers were made on S. S. agar plates only. The average numbers of colonies considered to be those of *E. typhosa* are shown in table 1. The maximum count was 1,000

TABLE 1.—*The sex and age of the chronic typhoid carriers treated with sulfadiazine, and the relative numbers of* E. typhosa *in the feces before, during, and after treatment*

Carrier	Sex	Age	Average number of suspicious colonies per S. S. agar plate inoculated by rectal swab			Average number of *E. typhosa* per cc of a heavy fecal suspension	
			Before treatment	During treatment	After treatment	During treatment	After treatment
E. D.	F	56	[1] Many	[1] Few	1,000		
E. M.	F	68	1,000	0	1,000		
M. O.	F	52	1,000	0	1,000		2,800,000
E. A.	F	75	1,000	0	630	0	10,000,000
C. A.	F	66	1,000	0	386	0	7,400,000
C. N.	M	65	833	0	715	233	8,045,000
P. W.	F	72	750	0	500	1,420	4,800,000
A. A.	F	47	733	0	660		42,000
M. M.	F	46	500	21	733		10,000,000
A. L.	F	38	467	2	143		
E. L.	F	72	458	0	358	165	305,000
M. D.	F	63	367	0	450	68	900,000
T. H.	M	55	334	0	1	25	19,000
A. S.	F	65	250	0	295	1,369	190,000
M. J.	F	56	175	0	32	100	4,500,000
M. C.	F	75	34	0	4	0	300
A. W.	F	58	3	0	6	10,000	10,000
D. A.	F	67	1	0	11		
J. R.	F	81	1	0	0		
Total			8,906	23	7,924	3,380	[2] 36,159,300
Average			495	1	417	338	[2] 3,615,930

[1] Counts were not made on the first case treated.
[2] For the 10 cases examined during treatment.

since numbers above this could not be accurately estimated. In the 15 carriers who were excreting many organisms, 42 of the 45 pretreatment cultures were positive on direct plating; in the 4 carriers excreting few organisms, 5 of 12 tests were positive.

The number of suspicious colonies found on the daily cultures progressively decreased under treatment. The rapidity of change varied, but in most of them there was a marked reduction by 48 hours. This usually continued until the organisms were not found by direct

[2] Arrangements for this study were made by the New York State Departments of Health and Mental Hygiene, and the patients were treated with the permission and cooperation of the respective superintendents and attending physicians in the hospitals concerned.

plating. The observations during treatment, as recorded in the table, represent the maximum therapeutic response. In all instances the average number of colonies on 3 successive examinations is given. The 3 cases which did not have negative plates for at least 3 successive days developed toxic manifestations which made it inadvisable to continue the drug. *E. typhosa* were frequently isolated from the enrichment medium or found on the bismuth sulfite pour plates when the specimen by direct plating was negative.

Treatment was continued in some cases for 7 days, in others for 14, and in 2 for 21 days. Three to seven days after treatment was withdrawn suspicious colonies reappeared on the S. S. agar plates. These increased in number. After 10 days to 2 weeks the average numbers of suspicious colonies approximated those found before treatment.

The growth on the S. S. agar plates inoculated from the passed fecal specimens did not differ materially from that on plates inoculated by rectal swabs. The variations with treatment were those described above.

The bismuth sulfite pour plates were used during and following treatment. The findings in a total of 67 counts are given. The ratio of the number of *E. typhosa* being excreted with and without treatment was in the order of 1:10,000.

Five carriers were observed alternately on and off treatment. Suspicious colonies decreased in number or disappeared with the first course of treatment, then reappeared after the drug was withdrawn. Following renewal of treatment they again decreased or entirely disappeared, but returned after a second withdrawal of medication.

Coliform organisms were markedly reduced in number during treatment. Swabs heavily coated with feces were used to inoculate plates of MacConkey agar. Before and after treatment a confluent overgrowth was usually obtained; during treatment few or no coliform colonies appeared.

There were irregularities in the quantitative observations described. This could be attributed in part to the inexact quantitative nature of the measures employed. Apparently there was also in some patients a fluctuation in the discharge of organisms. This was particularly evident in the case of one carrier—following a series of negative findings the plates began suddenly to be crowded with suspicious colonies. This was encountered first when the patient was off treatment but was observed a second time when she was again on treatment. This was the only case in which there was an increase in suspicious organisms during treatment. Here the plates had many suspicious colonies for 4 successive days, after which they became negative again.

Cultural findings on convalescent carriers and cases.—The following observations were made on patients in the Shreveport Charity

Hospital, Shreveport, La.[3] On August 11, 1942, the date of beginning this part of the study, there were 17 patients on the isolation wards with, or convalescing from, typhoid fever. Five with active symptoms and the 3 convalescents found to have consistently positive stools were placed on treatment. All patients admitted subsequently were included in the study. As of October 31, 1942, there were 24 patients in the series. Three were excluded from this analysis because of the lack of positive cultures. The cases represent the severe, hospitalized, endemic infections. Negroes predominate. Thus far they are equally divided by sex, and distributed by age in the first 4 decades.

Before treatment *E. typhosa* were found in 27 (46 percent) of 59 cultures on S. S. agar plates. During medication there was only 1 positive S. S. plate (a convalescent carrier) after the third day of treatment. By enrichment, *E. typhosa* was found in 36 (86 percent) of 42 examinations before treatment, in 3 (8 percent) of 36 tests after 1 week's medication, and in none of the 30 examinations after 2 weeks of treatment. The bismuth sulfite pour plates were regularly positive before treatment in all convalescent carriers and in all but 1 case. One-half of these tests were still positive after 1 week. Late in treatment there were 3 (6 percent) positive findings in the 51 tests of cases and 10 (48 percent) in 21 examinations of convalescent carriers.

The numbers of colonies believed to be those of *E. typhosa* per S. S. agar plate are tabulated in table 2. The data given correspond with data on chronic carriers recorded in table 1. There was a wider variation from individual to individual. Under medication there was a prompt decline. All plates were negative on the fourth day of treatment and continued so, except for the one test on a convalescent carrier. After medication was withdrawn, this same person again had positive S. S. agar plates, as did two of the cases.

The counts as determined by the bismuth sulfite pour plates are shown in the last columns of table 2. The average of all pretreatment cultures is given. The others are averages of 3 consecutive daily examinations on the sixth, seventh, and eighth; thirteenth, fourteenth, and fifteenth days of treatment; and on the sixth, seventh, and eighth days after medication was withdrawn. The next preceding or subsequent finding was used when cultures were not obtained on the specified days. (In 1 case, treated for more than 2 weeks, the later maximum therapeutic response was used.) These counts decreased with varying rapidity under treatment, but by the end of 1 week all were low and after 2 weeks positive colonies were rarely

[3] Arrangements for this study were made through Dr. G. W. McCoy, Professor of Preventive Medicine, Louisiana State Medical School, and the Louisiana State Health Department. It was conducted with the approval of Dr. Edgar Galloway, Superintendent, and the assistance of the resident house staff and the clinical pathological laboratory.

found. The magnitude of the reduction was as follows: In the cases (excluding the relapse) an excretion of 1,000,000 organisms before sulfadiazine was reduced to 130 by 1 week's treatment and to 1 by 2 weeks' medication; in convalescent carriers an excretion of 12,000 before treatment was reduced to 18 after 1 week and to 1 after 2 weeks' treatment. There was a particularly rapid disappearance of the pathogens from the stools of the individual whose treatment was started on the first day of a clinical relapse. An average count of 5,250,000 per cc. of a heavy fecal suspension for the 3 days before treatment was reduced to 200 in 2 days, to 10 in 3 days, and to 3 in 4 days. All cultures thereafter were negative.

TABLE 2.—*Color, sex, and age of convalescent carriers and culturally positive cases of typhoid fever treated with sulfadiazine, and the relative number of* E. typhosa *in the feces before, during, and after treatment*

Time in illness when sulfadiazine was started	Case	Color	Sex	Age	Average number of suspicious colonies per S. S. agar plate			Average number of *E. typhosa* per cc. of a heavy fecal suspension			
					Before treatment	During treatment	After treatment	Immediately before treatment	During treatment: At end of 1 week	During treatment: At end of 2 weeks	One week after treatment
Convalescence	A. J	N	F	17	42	0	[1] +	65,000	0	1	100,000
					100	[2] —	—	100,000	10	—	100,000
					0	0	—	8,333	284	15	—
	A. L	N	F	24	+	0	0	28,333	1	0	0
	J. W	N	M	17	+	0	0	100	1	3	838
					0	—	—	1,500	77	0	0
	E. P[3]				0	0	—	52,666	1	0	0
Total counts					142	0	+	255,932	374	19	200,838
Average counts					28	0	+	36,562	53	3	40,167
Fourth week	L. T	N	M	36	0	0	0	—	0	0	0
	F. S	N	M	10	275	0	0	—	1	—	0
Third week	L. E	N	M	24	+	—	—	88	—	—	—
	B. S	N	F	22	—	—	—	100	0	0	—
	L. W	N	F	23	—	—	1,000	50,000	50	0	10
	V. P	W	F	38	300	0	—	3,000	18	0	.3
	V. M	W	F	10	0	0	0	300	8	0	0
Second week	E. P	W	M	13	50	—	0	5,000	15	0	52,666
	R. T	N	F	8	0	—	—	20,000	0	0	0
	A. P	W	M	3	1,000	0	+	—	7	0	3
	H. M	N	M	7	0	0	—	100	7	0	0
	R. M	W	M	3	1,000	0	0	500,000	60	3	5
	R. T	W	M	22	55	—	—	100,000	67	0	—
	A. D	N	M	10	+	—	—	430	1	—	0
	F. J	N	M	34	0	0	0	4	1	0	0
First week	E. S	W	F	18	—	—	—	100,000	66	1	0
	L. J	N	F	35	0	0	—	50	3	0	—
	A. J	W	F	3	—	0	0	1,500,000	0	1	0
First day (relapse)	L. W[3]				1,000	0	0	5,250,000	0	0	—
Total counts					3,690	0	1,000 [4]0	7,529,072	301 3	2.3	52,684.3 [4]18.3
Average counts					282	0	100 [4]0	470,567	17	.1	3,763 [4]1 4

[1] + = positive, but plates unsatisfactory for counts.
[2] — = No count made.
[3] Repeat course of treatment.
[4] Excluding the one case with high count.

The infection recurred in 1 convalescent carrier (A. J.) after 11 days of medication as a first course and after a longer second course. There was an early recurrence following a similar first course in another convalescent carrier (J. W.) but not following his second course. Patient E. P. was admitted late in the second week of his disease. He became culturally negative under treatment. On the fourth day off medication cultures showed a few organisms and on the following 3 days, many. He was placed on treatment again and after 24 hours the daily cultures had few or no suspicious colonies. On the sixth and seventh days of medication when stool cultures were negative the patient had an elevation of temperature to 103.4°F. and *E. typhosa* was isolated on blood culture. He was treated as a convalescent carrier but the findings suggest that this may have been an aborted clinical relapse. Another patient (L. W.) had a definite clinical, as well as bacteriological, relapse. She received treatment beginning in the third week of her illness. Three stool specimens were obtained in the first 5 days after the medication was discontinued; all were negative. On each of the next 5 days she had from 4 to 35 *E. typhosa* per cc. of a heavy fecal suspension. She then began to excrete many organisms and on the sixth day thereafter fever developed. Treatment was started and, as stated above, the number of organisms rapidly decreased. A third patient (A. P.) began to discharge *E. typhosa* on the fifth day following the discontinuation of medication. During 9 days of further observation the highest count was 250 per cc. of a heavy fecal suspension, and the boy remained well. Treatment was not renewed because of a low neutrophile count. The child was discharged for follow-up at home. There were scattered post-treatment positive observations in some other cases which revealed the presence of only small numbers of *E. typhosa*. A more prolonged follow-up than was possible in these cases is obviously needed. Pending this, comment relative to bacteriological relapse is reserved.

Blood cultures are being taken every 2 days, but these have not yet provided significant laboratory evidence concerning the bacteriostatic action of the drug on organisms in the blood stream or in the internal tissues.

Comment.—The bacteriological findings indicate clearly that sulfadiazine markedly reduces the number of viable *E. typhosa* in the fecal discharges. The reduction was observed in cases treated early where the number of organisms would not tend to decrease in an unmodified course of the disease and in chronic carriers where the excretion would continue at a constant level. In the cases treated late and in the convalescent carriers the changes were observed immediately and regularly after the beginning of medication. This timing and the

rapidity of the modification differentiated the observed responses from changes which occur in the natural course of the infection.

The evidence indicates an adequate trial of sulfadiazine in typhoid fever but conclusions as to its therapeutic value must await the objective measures provided by a large series of cases.

Our findings do not encourage the hope that the chronic carrier state may be avoided by treating the persisting convalescent carrier. Chemotherapy failed to modify permanently the infection in the convalescent carrier whose treatment started late in convalescence.

SUMMARY

Sulfadiazine was used in the treatment of 19 chronic carriers, 4 convalescent carriers (including 1 treated as a case), 21 clinical cases, and 1 clinical relapse.

Quantitative cultural tests clearly demonstrated that this sulfonamide has a marked bacteriostatic effect on *E. typhosa* in the enteric tract.

The chronic-carrier state was not terminated by this treatment.

REFERENCE

(*1*) Watt, James, and Peterson, J. S.: Sulfaguanidine noneffective in the treatment of typhoid fever and typhoid carriers. Pub. Health Rep., 57: 872–873 (June 5, 1942).

RELAPSING FEVER: THE TICK *ORNITHODOROS TURICATA* AS A SPIROCHETAL RESERVOIR [1]

By Gordon E. Davis, *Senior Bacteriologist, United States Public Health Service*

On August 29, 1936, 86 *Ornithodoros turicata* were collected from the sand and from a cottontail rabbit (*Sylvilagus* sp.) taken in a prairie dog (*Cynomys* sp.) burrow near Ashland, Clark County, Kansas (Davis, 1936). A strain of relapsing fever spirochetes was recovered by feeding a group of these ticks on a white rat. One of the nymphs reared to a female served as the origin of the ticks and spirochetes used in a study of this species of *Ornithodoros* as a spirochetal reservoir.

F1 generation: A lot of 36 larvae from the female was allowed to engorge on a white rat; relapsing fever was produced in the host. Seventeen ticks that survived the larval molt were tested individually. Spirochetes were recovered from 6, or 35 percent. One tick from which spirochetes were recovered following each of 5 nymphal feedings (Nov. 30, 1938 to Dec. 12, 1939) and the first adult feeding (Jan. 24, 1940) was used to continue the study.

[1] From the Rocky Mountain Laboratory of the Division of Infectious Diseases of the National Institute of Health.

F2 generation: From the first oviposition there were 111 eggs and 82 larvae. Sixty-three larvae were tested in 6 groups of from 4 to 28. One host died before testing was completed, but spirochetes were recovered from the remaining 5. Fifty-seven ticks survived the larval molt. These were tested by feeding separately on white mice. At the first feeding spirochetes were recovered from 47 and at the second feeding spirochetes were recovered from 55, or 96 percent, of the ticks tested. All ticks were reared to adults. There were 30 males and 27 females. One of each sex failed to transmit the spirochete.

F3 generation: One hundred and three larvae from one of the F2 generation ticks were tested individually by feeding on white mice. Forty mice became infected. At the first nymphal feeding, spirochetes were recovered from an additional 36. A high mortality occurred among the ticks at the time of the larval molt but spirochetes were recovered from all of the 66 ticks surviving to the second nymphal feeding. There were 32 males and 34 females.

F4 generation: Forty-four larvae from a third generation female were tested individually. Spirochetes were recovered from 15 larvae and from 17 of 35 surviving first nymphs. Among 13 ticks developed from a second female of this generation, 9 were found to be carrying spirochetes, and of 59 ticks from another female, 24 were shown to be infective. There was a total of 44 males and 44 females. Fifty-eight percent of the former and 52 percent of the latter were shown to be carrying spirochetes. Progeny of 3 females were used since oviposition was much delayed in the females first selected.

F5 generation: One hundred and forty-five larvae from one of the F4 generation females tested resulted in 68 infected mice. At the first nymphal feeding spirochetes were recovered from each of the surviving 136 nymphs. All molted normally to second stage nymphs in from 8 to 12 days. A summation of the results from the larval and first nymphal feedings showed that at least 142 of the 145 larvae and all ticks that survived the larval molt were infective.

DISCUSSION

Beginning with a spirochete-bearing female reared from ticks collected in nature, the progeny resulting from the first oviposition by 1 female (in one instance 3 females) of each of the 5 succeeding generations were tested quantitatively for spirochetes. These tests covered a period of nearly 6 years.

With the exceptions noted, all tests were made by feeding the ticks individually, in each developmental stage, on white mice. Beginning with the fifth day after tick feeding, tail blood was examined for 4 successive days. The thick drop and Giemsa's method of staining were used.

The invasiveness of the spirochetes did not diminish over a period of nearly 6 years. They appeared in the peripheral blood of all mice which were hosts to the F5 generation of ticks on the first day of examination, and the fifth day after feeding.

Since factors, other than host availability, which regulate the populations of burrow-dwelling ticks are not definitely known, calculations based on laboratory observations cannot be safely applied to ticks under natural conditions. However, certain inferences may be drawn. In the F2 to F4 generations all surviving ticks were reared to adults with a total of 88 infective males and 83 infective females. In the F5 generation none were reared beyond the second nymphal stage as it became necessary to terminate the experiment. However, in the rearing of hundreds of ticks of several species of *Ornithodoros*, the period of greatest mortality is at the time of the larval molt. Ticks surviving the first ecdysis usually succeed in reaching the adult stage. The proportion of males and females approximates a 50–50 ratio. Although the males may continue to infect the rodent host at successive feedings through life, transmission during copulation has not been demonstrated (Davis, 1941). It is therefore concluded that males play no part in the continuity of the spirochete in the tick species.

From the first oviposition in the F2, F3, and F4 generations, there were, respectively, 26, 34, and 23 infective females, and, based on the 50–50 ratio, there were an additional 3 in the F1 generation and 68 in the F5 generation to perpetuate infective progeny.

Furthermore, in studies on the biology of *O. turicata*, oviposition has taken place at least five times within a 12-month period. The number of eggs deposited at the first oviposition was, as a rule, less than the number deposited at the second or third period

The data presented indicate that in the formulation of the hypothesis of rodent hosts as spirochetal reservoirs, as stressed by a number of authors, the biological phenomenon of transovarial transmission has been neglected. Although ticks of the genus *Ornithodoros* have many hosts in common with ticks of other genera, the known transmission of relapsing fever spirochetes only by ticks of this genus suggests that these spirochetes are primarily commensals of these ticks rather than parasites of the rodent host.

SUMMARY AND CONCLUSION

A quantitative study of the transovarial transmission of spirochetes through five generations of *O. turicata* has been made.

Progeny found to be infective in each of the five generations amounted to 16 ticks (35 percent), 55 ticks (96 percent), 66 ticks (100 percent), 107 ticks (47 percent), and 136 ticks (100 percent), respectively.

These results indicate that the tick itself may be a more efficient "spirochetal reservoir" than the rodent host.

REFERENCES

Davis, Gordon E.: *Ornithodoros turicata*. The possible vector of relapsing fever in southwestern Kansas. Pub. Health Rep., **51**: 1719 (1936).
——————: *Ornithodoros turicata*. The male; feeding and copulation habits, fertility, span of life, and the transmission of relapsing fever spirochetes. Pub. Health Rep., **56**: 1799–1802 (1941).

TULAREMIA: SPONTANEOUS OCCURRENCE IN SHREWS [1]

By Glen M. Kohls, *Associate Entomologist*, and Edward A. Steinhaus, *Associate Bacteriologist, United States Public Health Service*

The occurrence of tularemia in the shrew, *Sorex vagrans monticola*, and the field mouse, *Microtus pennsylvanicus modestus*,[2] has recently been demonstrated in connection with field studies of tularemia being made at the Rocky Mountain Laboratory. The finding of infected shrews adds another species of the native fauna to the already considerable number known to contract this disease in nature.

On November 5, 1942, 3 shrews and 10 field mice of the species mentioned above were caught in traps set in a marshy area 3 miles east of Hamilton, Mont. No gross lesions were observed at autopsy. The spleens and livers of each species were pooled and injected into 4 guinea pigs. The latter died from 6 to 12 days later and the gross pathology was suggestive of tularemia. *Pasteurella tularensis* was isolated from the spleen and liver of 2 of the guinea pigs that received the shrew tissues and from 3 of those that received the field mouse tissues.

Infection in *Microtus californicus aestuarinus* in Contra Costa County, Calif., has been reported by Perry (1928) and in *Microtus pennsylvanicus* and *Microtus* sp. in Madison, Musselshell, and Wheatland Counties in Montana by Jellison, Kohls, Butler, and Weaver (1942).

REFERENCES

(*1*) Jellison, W. L., Kohls, G. M., Butler, W. J., and Weaver, J. A.: Epizootic tularemia in the beaver, *Castor canadensis*, and the contamination of stream water with *Pasteurella tularensis*. Am. J. Hyg., **36**: 168–182 (1942).
(*2*) Perry, J. C.: Tularaemia among meadow mice (*Microtus californicus aestuarinus*) in California. Pub. Health Rep., **43**: 260–263 (1928).

[1] From the Rocky Mountain Laboratory, Division of Infectious Diseases, National Institute of Health.
[2] The writers are indebted to E. Raymond Hall, of the Museum of Vertebrate Zoology, University of California, for these identifications

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 22, 1943

Summary

Reports for the current week show no significant change as compared with similar reports for recent weeks. Of the first 9 common communicable diseases included in the following table, current totals of only influenza, meningococcus meningitis, poliomyelitis, and whooping cough are above figures for both the preceding week and the comparable 5-year (1938–42) medians. As compared with the corresponding period last year, increases have been recorded for the first 20 weeks of the current year for the dysenteries, infectious encephalitis, measles, meningococcus meningitis, poliomyelitis, scarlet fever, smallpox, endemic typhus fever, and whooping cough.

Meningococcus meningitis cases reported for the week totaled 544, as compared with 485 for the preceding week (exclusive of delayed reports). Increases for the week were reported in 6 of the geographic areas of the country. In the New England and Mountain States the incidence remained practically the same, while a decrease was shown in the West North Central States from 45 to 23. States reporting more than 20 cases for the week (last week's figures in parentheses) are as follows: New York, 89 (70); New Jersey, 41 (42); Pennsylvania, 39 (34); Tennessee, 32 (9); California, 31 (17); Virginia, 25 (19); Ohio, 22 (15).

A total of 36 cases of poliomyelitis was reported, as compared with 28 cases for the preceding week and a 5-year median of 26. Of the total, 13 cases were reported in California, 4 in Texas, and 19 in 12 other States.

Of 85 cases of typhoid fever, as compared with 54 last week and 110 for the 5-year median, 14 occurred in New York and 10 in Texas. No other State reported more than 5 cases.

Among other reports for the week were the following: Dysentery, all forms, 501 cases; encephalitis, infectious, 8; Rocky Mountain spotted fever, 9; tularemia, 28; endemic typhus fever, 52.

Deaths registered during the week in 88 large cities of the United States totaled 8,847, as compared with 9,202 last week and an average for the past 3 years of 8,215. The accumulated figure for the first 20 weeks of the year is 194,888, as compared with 177,243 for the corresponding period in 1942.

Telegraphic morbidity reports from State health officers for the week ended May 22, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	May 22, 1943	May 23, 1942		May 22, 1943	May 23, 1942		May 22, 1943	May 23, 1942		May 22, 1943	May 23, 1942	
NEW ENGLAND												
Maine	0	0	1	------	------	------	55	69	141	7	1	0
New Hampshire	[3] 0	0	0	------	------	------	60	45	40	1	1	0
Vermont	0	1	0	------	------	------	233	235	83	0	0	0
Massachusetts	2	5	5	------	------	------	1,844	1,219	1,053	18	7	1
Rhode Island	0	0	0	------	------	------	39	216	80	13	0	0
Connecticut	6	0	2	------	1	1	438	492	467	11	2	0
MIDDLE ATLANTIC												
New York	19	15	18	[1] 4	[1] 5	[1] 7	3,539	856	2,251	89	20	6
New Jersey	2	4	7	13	2	5	2,320	819	845	41	6	1
Pennsylvania	11	6	16	1	------	------	1,972	1,591	1,591	39	2	4
EAST NORTH CENTRAL												
Ohio	7	7	6	16	5	5	734	469	469	22	3	1
Indiana	3	2	4	13	------	5	458	58	58	11	0	0
Illinois	19	17	17	6	2	13	1,734	319	319	19	0	0
Michigan [2]	3	5	5	3	------	2	4,574	207	802	18	0	0
Wisconsin	4	0	1	39	26	26	2,319	1,383	1,383	10	0	1
WEST NORTH CENTRAL												
Minnesota	1	1	2	2	------	1	435	838	266	4	0	0
Iowa	3	3	3	2	------	------	127	278	278	4	1	1
Missouri	3	7	5	4	------	1	308	247	198	12	1	1
North Dakota	2	2	1	3	------	2	101	67	56	0	0	0
South Dakota	0	1	1	------	------	------	227	21	17	0	0	0
Nebraska	1	1	1	1	10	------	195	264	213	0	0	0
Kansas	2	1	3	------	3	3	494	378	407	3	1	1
SOUTH ATLANTIC												
Delaware	0	1	1	------	------	------	168	10	11	1	0	0
Maryland [2]	5	8	4	8	2	3	216	369	318	18	7	2
Dist. of Col.	0	2	2	1	1	------	119	97	97	6	2	0
Virginia	4	4	9	110	106	106	376	155	413	25	6	3
West Virginia	7	3	5	------	13	16	97	51	51	3	0	1
North Carolina	5	4	6	4	8	3	402	352	472	16	1	1
South Carolina	5	11	5	215	188	188	87	213	68	5	0	0
Georgia	3	3	3	18	8	23	75	90	132	3	1	0
Florida	3	1	1	19	------	2	52	93	93	10	0	0
EAST SOUTH CENTRAL												
Kentucky	5	2	4	9	2	2	258	75	152	9	0	1
Tennessee	3	1	2	21	15	37	277	150	150	32	2	2
Alabama	0	6	6	264	119	58	114	98	176	9	2	1
Mississippi [2]	2	3	5	------	------	------	------	------	------	10	1	1
WEST SOUTH CENTRAL												
Arkansas	8	2	3	3	39	29	64	121	142	2	0	0
Louisiana	4	5	5	4	4	4	48	114	52	5	2	0
Oklahoma	2	3	3	8	31	31	71	180	164	1	0	0
Texas	22	21	23	482	302	302	443	733	733	11	1	1
MOUNTAIN												
Montana	0	0	0	6	2	2	175	113	78	0	0	0
Idaho	0	0	0	1	------	------	56	120	23	3	0	0
Wyoming	0	0	0	11	44	------	163	52	30	0	0	0
Colorado	6	5	6	20	42	4	451	248	248	2	0	0
New Mexico	1	0	0	2	------	1	32	41	99	1	0	1
Arizona	0	0	2	61	74	53	16	158	125	2	0	0
Utah [2]	0	0	0	6	8	3	98	1,104	317	2	0	0
Nevada	0	0	------	------	------	------	2	44	------	0	0	------
PACIFIC												
Washington	2	2	0	2	3	------	386	657	486	9	6	0
Oregon	3	1	2	68	6	15	218	100	100	6	1	0
California	16	18	18	51	53	49	1,053	5,359	978	31	4	2
Total	194	184	238	1,501	1,124	1,124	27,723	20,966	20,966	544	81	48
20 weeks	[3] 5,120	5,439	6,650	72,641	74,496	145,395	396,365	372,782	372,782	9,849	1,567	973

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended May 22, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	May 22, 1943	May 23, 1942		May 22, 1943	May 23, 1942		May 22, 1943	May 23, 1942		May 22, 1943	May 23, 1942	
NEW ENGLAND												
Maine	0	0	0	16	16	12	0	0	0	0	0	0
New Hampshire	0	0	0	7	4	4	0	0	0	0	0	0
Vermont	0	0	0	18	15	8	0	0	0	0	0	0
Massachusetts	0	1	0	537	256	214	0	0	0	2	2	2
Rhode Island	0	0	0	37	19	15	0	0	0	0	0	0
Connecticut	0	0	0	110	23	53	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	0	1	0	569	309	554	0	0	0	14	5	5
New Jersey	1	2	0	137	117	229	0	0	0	1	2	2
Pennsylvania	0	0	0	269	324	388	0	0	0	3	4	5
EAST NORTH CENTRAL												
Ohio	0	1	0	231	223	228	6	0	0	5	7	5
Indiana	0	0	0	59	43	82	1	0	4	1	4	3
Illinois	1	1	1	161	145	394	1	0	6	2	1	4
Michigan [2]	0	1	0	129	220	384	0	1	1	3	3	3
Wisconsin	1	0	0	386	98	128	0	3	3	1	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	69	62	70	0	0	1	0	2	1
Iowa	0	0	0	41	37	41	0	0	8	0	1	1
Missouri	0	1	0	44	48	68	0	0	3	1	0	0
North Dakota	0	0	0	6	6	12	0	0	1	0	0	0
South Dakota	0	0	0	14	22	12	0	0	11	0	0	0
Nebraska	0	0	0	20	11	11	0	0	1	0	2	0
Kansas	2	2	0	37	47	47	1	0	1	0	0	1
SOUTH ATLANTIC												
Delaware	0	0	0	5	18	10	0	0	0	0	0	0
Maryland [3]	0	0	0	100	71	4	0	0	0	0	1	2
Dist. of Col.	0	1	0	12	12	12	0	0	0	0	0	0
Virginia	1	1	1	32	11	18	0	0	0	1	4	4
West Virginia	1	0	0	15	21	35	1	0	0	2	1	2
North Carolina	0	1	1	21	13	16	0	1	1	0	1	2
South Carolina	1	3	0	2	0	2	0	2	0	0	5	2
Georgia	0	1	0	1	6	16	0	1	2	5	5	6
Florida	0	1	1	25	0	4	0	0	0	5	4	4
EAST SOUTH CENTRAL												
Kentucky	1	1	0	14	48	48	0	0	1	3	0	5
Tennessee	0	1	0	26	28	43	1	0	1	3	0	4
Alabama	0	0	0	5	10	7	0	0	0	8	2	2
Mississippi [2]	3	1	1	11	2	3	1	0	1	1	1	1
WEST SOUTH CENTRAL												
Arkansas	0	3	1	2	0	4	1	0	1	4	1	2
Louisiana	2	0	1	7	9	7	0	3	0	4	13	7
Oklahoma	0	0	0	10	10	14	1	0	0	3	2	8
Texas	4	0	1	33	18	33	0	5	5	10	11	7
MOUNTAIN												
Montana	0	0	0	11	9	12	0	0	0	0	0	1
Idaho	0	0	0	119	2	2	0	0	0	0	0	0
Wyoming	0	0	0	34	11	5	0	0	0	0	0	0
Colorado	0	0	0	69	15	30	1	0	3	0	1	1
New Mexico	0	1	0	4	1	2	0	0	0	1	2	2
Arizona	3	0	0	8	8	8	0	0	0	0	2	1
Utah [2]	0	0	0	31	8	15	0	0	0	0	0	0
Nevada	0	0	-----	0	0	-----	0	0	-----	0	0	-----
PACIFIC												
Washington	2	0	0	30	23	25	0	1	1	2	1	0
Oregon	0	0	0	22	6	8	1	1	1	0	0	1
California	13	1	2	140	95	134	0	0	6	5	3	5
Total	36	26	26	3,686	2,500	3,672	16	18	63	85	93	110
20 weeks	519	417	417	79,410	74,581	96,417	517	437	1,441	1,168	1,600	1,670

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended May 22, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Whooping cough: Week ended May 22, 1943	Whooping cough: Week ended May 23, 1942	Whooping cough: Median 1938–42	Week ended May 22, 1943: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENGLAND												
Maine	23	21	36	0	0	0	0	0	0	0	0	0
New Hampshire	0	1	4	0	0	0	0	0	0	0	0	0
Vermont	10	23	27	0	0	0	0	0	0	0	0	0
Massachusetts	132	193	176	0	0	0	0	0	0	0	0	0
Rhode Island	41	47	29	0	0	0	0	0	0	0	0	0
Connecticut	81	74	74	0	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	260	441	409	0	3	47	0	5	0	0	0	1
New Jersey	189	369	134	0	3	0	1	0	0	0	0	0
Pennsylvania	213	231	276	0	0	1	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	167	201	201	0	0	0	0	0	0	0	0	0
Indiana	51	30	35	0	3	0	0	0	0	0	0	0
Illinois	100	255	141	0	0	0	0	0	0	0	9	0
Michigan[2]	291	233	233	0	0	2	0	0	0	0	0	0
Wisconsin	273	184	170	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	78	41	41	0	2	0	0	0	0	0	0	0
Iowa	44	20	30	0	0	0	0	0	0	0	0	0
Missouri	21	12	19	0	0	0	1	0	0	0	0	0
North Dakota	4	10	16	0	0	0	0	0	0	0	0	0
South Dakota	2	1	2	0	0	0	0	0	0	1	0	0
Nebraska	13	6	16	0	0	0	0	0	0	0	0	0
Kansas	80	42	42	0	2	0	0	1	0	0	0	0
SOUTH ATLANTIC												
Delaware	3	2	6	0	0	0	0	0	0	0	0	0
Maryland[3]	103	65	65	0	0	0	2	0	0	1	0	0
Dist. of Col.	24	9	9	0	0	0	0	0	0	0	0	0
Virginia	155	96	96	0	1	0	90	0	0	0	0	0
West Virginia	52	12	32	0	0	0	0	0	0	0	0	0
North Carolina	257	94	218	0	0	0	0	0	0	0	0	1
South Carolina	45	117	105	0	0	14	0	0	0	0	1	1
Georgia	23	43	58	0	0	23	1	0	0	0	1	9
Florida	7	13	19	0	6	1	0	0	0	0	0	13
EAST SOUTH CENTRAL												
Kentucky	7	72	72	0	0	0	0	0	0	0	0	0
Tennessee	58	33	45	0	0	0	0	0	0	1	3	0
Alabama	61	61	54	0	0	0	0	0	0	0	0	3
Mississippi[2]	------	---	------	0	0	0	0	0	0	0	1	2
WEST SOUTH CENTRAL												
Arkansas	39	13	21	0	1	1	0	0	0	0	6	0
Louisiana	8	36	36	0	0	2	0	0	0	0	0	5
Oklahoma	35	15	26	0	0	0	0	0	0	0	0	0
Texas	621	118	309	0	13	236	0	1	0	0	2	17
MOUNTAIN												
Montana	14	13	24	0	0	0	0	0	0	2	3	0
Idaho	0	5	7	0	0	0	0	0	0	0	0	0
Wyoming	1	10	3	0	0	0	0	0	0	1	0	0
Colorado	30	23	38	0	0	0	0	0	0	1	0	0
New Mexico	16	23	23	0	0	0	0	0	0	0	0	0
Arizona	18	13	23	0	0	0	19	0	0	0	0	0
Utah[2]	67	21	72	0	0	0	0	0	0	1	2	0
Nevada	0	0	------	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	25	58	58	0	0	0	0	0	0	0	0	0
Oregon	28	10	23	0	0	0	0	0	0	1	0	0
California	561	357	501	0	3	23	0	1	0	0	0	0
Total	4,331	3,767	3,767	0	37	350	114	8	0	9	28	52
20 weeks	81,117	76,786	80,002	26	597	4,111	987	219	9	65	344	919
20 weeks, 1942	------	------	------	32	350	1,433	840	162	24	78	382	713

[1] New York City only
[2] Period ended earlier than Saturday.
[3] Later information shows no cases of diphtheria in New Hampshire for the week ended May 1 instead of 3 as previously reported.

WEEKLY REPORTS FROM CITIES

City reports for week ended May 8, 1943

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	10	1	0	0	1	0	0	18
New Hampshire:												
Concord	0	0	------	0	0	0	2	0	1	0	0	0
Vermont:												
Barre	0	0	------	0	1	0	0	0	1	0	0	0
Massachusetts:												
Boston	0	0	------	0	264	18	18	0	170	0	0	25
Fall River	0	0	------	0	86	0	2	0	0	0	0	5
Springfield	0	0	------	0	15	2	0	0	42	0	0	0
Worcester	0	0	------	0	173	1	15	0	17	0	0	4
Rhode Island:												
Providence	1	0	------	0	2	6	5	0	11	0	0	27
Connecticut:												
Bridgeport	0	0	------	0	1	1	6	0	4	0	0	0
Hartford	0	0	------	0	46	2	7	0	5	0	0	0
New Haven	0	0	------	0	11	0	0	0	2	0	0	4
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	0	104	3	9	0	7	0	0	10
New York	11	3	13	4	1,306	84	91	2	353	0	3	66
Rochester	0	0	------	0	132	4	5	0	9	0	1	11
Syracuse	0	0	------	0	101	2	3	0	4	0	1	12
New Jersey:												
Camden	0	0	------	0	7	1	0	0	3	0	0	1
Newark	1	0	1	0	413	9	8	0	15	0	1	27
Trenton	0	0	2	1	40	0	4	0	5	0	0	0
Pennsylvania:												
Philadelphia	0	0	1	1	290	10	35	0	126	0	0	65
Pittsburgh	1	0	------	0	42	5	14	0	15	0	0	26
Reading	0	0	------	0	85	1	0	0	3	0	0	4
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	1	1	58	0	4	0	41	0	0	0
Cleveland	8	0	5	2	31	4	16	0	56	0	0	33
Columbus	0	0	------	0	86	0	2	0	13	0	0	0
Indiana:												
Fort Wayne	0	0	------	0	6	0	1	0	8	0	0	0
Indianapolis	1	0	------	0	217	5	11	0	25	0	0	28
South Bend	0	0	------	0	6	0	0	0	1	0	0	4
Terre Haute	0	0	------	0	12	0	2	0	0	0	0	0
Illinois:												
Chicago	27	0	1	1	968	6	37	0	86	0	0	47
Springfield	0	0	------	0	25	0	2	0	1	0	0	10
Michigan:												
Detroit	1	0	1	2	1,793	12	15	0	34	0	0	93
Flint	0	0	------	0	283	0	0	0	2	0	0	28
Grand Rapids	0	0	------	0	18	0	3	0	5	0	0	10
Wisconsin:												
Kenosha	0	0	------	0	5	0	0	0	9	0	0	0
Milwaukee	0	0	1	1	569	0	1	1	156	0	0	29
Racine	0	0	------	0	0	0	1	0	0	0	0	0
Superior	0	0	------	0	29	0	0	0	5	0	0	1
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	1	11	0	0	0	4	0	0	1
Minneapolis	1	0	------	0	239	0	1	0	26	0	0	19
St. Paul	0	0	------	0	23	0	4	0	5	0	0	55
Missouri:												
Kansas City	0	0	------	1	121	2	4	0	42	0	0	11
St. Joseph	0	0	------	0	11	0	2	0	0	0	0	3
St. Louis	0	0	3	1	52	8	16	0	11	0	0	15

City reports for week ended May 8, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo	0	0	------	0	5	0	3	0	1	0	0	1
Nebraska:												
Omaha	0	0	------	0	10	0	1	0	8	0	1	0
Kansas:												
Topeka	0	0	------	0	121	1	0	0	0	0	0	28
Wichita	0	0	------	0	174	0	3	0	0	0	1	2
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	18	5	2	0	0	0	0	0
Maryland:												
Baltimore	0	0	5	0	113	18	19	0	67	0	2	99
Cumberland	0	0	------	0	0	0	0	0	0	0	0	0
Frederick	0	0	------	0	6	0	1	0	0	0	0	0
Dist. of Col.:												
Washington	2	0	2	0	77	5	8	0	22	0	0	28
Virginia:												
Lynchburg	0	0	------	0	4	2	0	0	0	0	0	13
Richmond	0	0	------	1	13	2	4	0	3	0	0	0
Roanoke	0	0	------	0	0	0	0	0	0	0	0	3
West Virginia:												
Charleston	0	0	1	0	1	0	0	0	1	1	0	0
Wheeling	0	0	------	0	0	1	2	0	2	0	0	3
North Carolina:												
Winston-Salem	0	0	------	0	9	0	1	0	1	0	0	34
South Carolina:												
Charleston	0	0	4	0	3	0	2	0	0	0	0	3
Georgia:												
Atlanta	0	0	9	1	17	0	3	0	2	0	0	2
Brunswick	0	0	------	0	5	0	0	0	1	0	0	1
Savannah	0	0	1	1	0	2	1	0	1	0	0	0
Florida:												
Tampa	0	0	------	0	2	0	2	0	0	0	0	1
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	------	2	174	1	3	0	6	0	0	14
Nashville	0	0	------	1	19	0	2	0	5	0	0	4
Alabama:												
Birmingham	1	0	3	0	8	2	1	0	1	0	0	1
Mobile	0	0	1	1	0	0	0	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	1	0	9	0	5	0	0	0	0	1
Louisiana:												
New Orleans	0	0	5	1	25	3	7	0	1	0	0	2
Shreveport	0	0	------	0	0	0	3	0	0	1	0	0
Texas:												
Dallas	0	0	------	0	4	0	2	0	3	0	0	9
Galveston	0	0	------	6	0	1	4	0	1	0	0	1
Houston	0	0	------	0	4	0	8	0	0	0	0	11
San Antonio	1	0	1	1	9	0	5	0	0	0	0	0
MOUNTAIN												
Montana:												
Billings	0	0	------	0	2	0	1	0	1	0	0	0
Great Falls	0	0	------	0	24	0	0	0	1	0	0	0
Helena	0	0	------	0	26	0	0	0	0	0	0	0
Missoula	0	0	------	0	1	0	1	0	1	0	0	0
Idaho:												
Boise	0	0	------	0	0	0	0	0	0	0	0	0
Colorado:												
Denver	3	0	5	2	276	0	3	0	6	0	0	13
Pueblo	0	0	------	0	9	0	1	0	1	0	0	7
Utah:												
Salt Lake City	0	0	------	0	72	5	1	0	8	0	0	32

City reports for week ended May 8, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	3	0		0	161	7	0	0	8	0	0	9
Spokane	0	0		0	46	0	3	0	2	0	0	9
Tacoma	0	0		0	6	0	0	0	1	0	0	0
California:												
Los Angeles	2	0	13	2	143	4	9	4	21	0	0	56
Sacramento	1	0		0	8	2	1	0	3	0	0	16
San Francisco	2	0	5	0	126	9	12	1	12	0	0	44
Total	68	3	85	29	9,422	257	470	8	1,515	2	10	1,157
Corresponding week 1942	62	4	63	25	6,022	46	310	3	1,153	0	18	1,278
Average, 1938-42	76		108	[1] 25	[2] 6,126		[1] 362		1,532	10	19	1,217

Dysentery, amebic.—Cases: Boston, 7; New York, 2; Charleston, S. C., 1; San Francisco, 1.
Dysentery, bacillary.—Cases: Buffalo, 3; Rochester, 1; Detroit, 1, Charleston, S. C., 9; Los Angeles, 1.
Dysentery, unspecified.—Cases: San Antonio, 12.
Typhus fever.—Cases: Philadelphia, 1; Charleston, S. C., 1; Savannah, 1; Galveston, 1.

[1] 3-year average, 1940-42.
[2] 5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (estimated population, 1942, 34,680,400)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	2.5	0.0	0.0	0.0	1,515	77.0	136.6	0.0	631	0.0	0.0	206
Middle Atlantic	5.8	1.3	7.6	2.7	1,124	53.1	75.4	0.9	241	0.0	2.7	99
East North Central	22.2	0.0	5.3	4.1	2,398	15.8	55.5	0.6	258	0.0	6.0	165
West North Central	2.0	0.0	5.9	5.9	1,499	21.5	66.4	0.0	190	0.0	3.9	299
South Atlantic	3.5	0.0	38.2	5.2	465	60.7	78.1	0.0	174	1.7	3.5	325
East South Central	5.9	0.0	23.8	23.8	1,194	17.8	85.6	0.0	71	0.0	0.0	113
West South Central	2.9	0.0	20.5	5.9	150	11.7	99.7	0.0	15	2.9	0.0	70
Mountain	24.1	0.0	40.2	16.1	3,296	40.2	56.3	0.0	145	0.0	0.0	418
Pacific	14.0	0.0	31.5	3.5	856	38.4	43.7	8.7	82	0.0	0.0	234
Total	10.2	0.5	12.8	4.4	1,417	38.6	70.7	1.2	228	0.3	1.5	174

PLAGUE INFECTION IN CALIFORNIA AND NEW MEXICO

Plague infection has been reported proved in pools of fleas and organs from rodents collected in Alameda and Monterey Counties, Calif., and Lincoln County, N. Mex., as follows:

CALIFORNIA

Alameda County: May 17, organs from 5 rats caught at Moore Dry Dock, Oakland District No. 2.

Monterey County—Fort Ord Military Reservation: April 9, Area C-2, organs from 20 mice, *Microtus* sp.; April 14, Area D, pool of 21 fleas

from 19 mice, *Peromyscus* sp.; April 18, Area E (N), organs from 44 mice, *Microtus* sp.; April 19, Area E (N), organs from 2 ground squirrels, *C. beecheyi*, and 19 mice, *Microtus* sp., also, April 19, Area E (S), organs from 36 mice, *Microtus* sp., and Area D, organs from 9 mice, *Peromyscus* sp.; April 20, Area E (1), organs from 2 ground squirrels, *C. beecheyi*, and April 20, Field Ranch, 12 miles southwest of Salinas, a pool of 77 fleas from 22 mice, *M. californicus*, and 2 mice, *Peromyscus* sp.

NEW MEXICO

Lincoln County: April 27, in a pool of 16 fleas from 3 grasshopper mice, *Onychomys torridus*, taken 8 miles south of Carrizozo, Indian Rock area.

DEATH FROM PLAGUE IN CALIFORNIA

The case of plague reported in Siskiyou County, Calif., with onset on November 8 or 9, 1942, and stated to have recovered,[1] terminated fatally on January 10, 1943, according to Dr. Wilton L. Halverson, Director of Public Health of California. In a letter dated May 10, 1943, Dr. Halverson states that the diagnosis established at autopsy was "bubonic plague and chronic plague encephalitis."

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—March 1943.—During the month of March 1943 certain notifiable diseases were reported in the Panama Canal Zone, and terminal cities, as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	36		14		9		7		66	
Diphtheria	12		5	1	1				18	1
Dysentery (amebic)	1	1	1		2		4		8	1
Dysentery (bacillary)	1								1	
Malaria [1]	29		1		250		118	1	398	1
Measles	3				18				21	
Mumps	42				27		7		76	
Paratyphoid fever				1	3		1		4	1
Pneumonia		2		5	25			4	[2] 25	11
Tuberculosis		25		2	4	2		5	[2] 4	34
Typhoid fever	1						2		3	
Whooping cough					4				[2] 4	
Leprosy								1		1

[1] Exclusive of 155 recurrent cases.
[2] In the Canal Zone only.

[1] Public Health Reports, December 4, 1942, pp. 1879–80, and April 16, 1943, p. 640.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended April 24, 1943.—During the week ended April 24, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		11		115	216	39	19			460
Diphtheria		12	1	12		6				31
German measles		1		12	58	7	18		12	132
Influenza		5	6		11	5			26	53
Measles		67	1	97	1,004	121	201	136	197	1,914
Meningitis, meningococcus		3		2	5	6				17
Mumps	1	75		61	849	97	75			1,392
Scarlet fever	3		30	88	198	33	30			477
Tuberculosis (all forms)	3	3	1	59	42	5				114
Typhoid and paratyphoid fever			3	7	2	1	2			15
Undulant fever					1					1
Whooping cough				78	141	87	8		29	371

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January-February 1943	March 1943	April 1943—week ended—			
				3	10	17	24
ASIA							
Ceylon	C	36	11				
India	C	72,977	5,324				
Calcutta	C	293	254	70	80		
Madras	C	936	26	2			
Vizagapatam	C	4					

PLAGUE

[C indicates cases; D, deaths; P, present]

Place		January-February 1943	March 1943	April 1943—week ended— 3	10	17	24
AFRICA							
Belgian Congo—Plague-infected rats		P					
British East Africa:							
Kenya	C	9	1		1		
Uganda	C		6				
Madagascar	C	17					
Morocco	C	23					
Union of South Africa	C	56	6				
ASIA							
India	C	834	187				
Indochina	C	3					
Palestine	C	[1] 7	[1] 1				
SOUTH AMERICA							
Peru:							
Lambayeque Department	C	2					
Libertad Department	C	6	3				
Lima Department	C	3					
Lima	C	1					
Plague-infected rats		P					
OCEANIA							
Hawaii Territory:							
Hamakua District [2]	D		2			1	
Plague-infected rats		26	21			3	

[1] At Jaffa and vicinity.
[2] During the week ended May 8, 1943, 1 death from plague was reported in Honokaa, Hamakua District, T. H.

SMALLPOX

[C indicates cases; D, deaths]

Place		January-February 1943	March 1943	April 1943—week ended— 3	10	17	24
AFRICA							
Algeria	C	150	128				
Angola	C	493					
Belgian Congo	C	303	136	41	38		
British East Africa:							
Mombasa	C		3				
Tanganyika	C		11				
Dahomey	C	25					
Egypt	C	10	10				
French Guinea	C	7					
Gold Coast	C	2					
Ivory Coast	C	90					
Mauritania	C	1					
Morocco	C	266	5	1			
Mozambique	C	1					
Nigeria	C	959	347	237	254		
Niger Territory	C	46					
Senegal	C	16	2				
Sudan (French)	C	394					
Union of South Africa	C	57					
ASIA							
India	C	2,871	2,603	851	686		
Indochina	C	718	880				
Iran	C	40					
Iraq	C	117	39	3			
Palestine	C	28					
Syria and Lebanon	C	418	135	10			
EUROPE							
France	C	1					
Scotland	C	1					
Portugal	C	10	4	2	1	2	
Spain	C	63	21				
Turkey	C	2,455	1,301				
NORTH AMERICA							
Canada	C	1					
Guatemala	C	2					
Mexico	C	22	5	8	2	3	2
SOUTH AMERICA							
Brazil	C	38		1		1	
Colombia	C	14	27				
Ecuador	C	9	1				
Peru	D	6	2				
Venezuela	C	7	2				

TYPHUS FEVER

[C indicates cases]

Place		January-February 1943	March 1943	April 1943—week ended— 3	10	17	24
AFRICA							
Algeria	C	1,112	1,584				
Belgian Congo	C	2					
British East Africa: Kenya	C	2	1				
Egypt	C	5,705	4,738	1,719	1,631	1,920	
Gold Coast	C	3					
Morocco	C	2,957	159	37	40		
Nigeria	C		1				
Spanish Morocco	C	1					
Union of South Africa	C	325	1				
ASIA							
Afghanistan	C	520					
China: Shanghai	C	6	6				
India	C	12	[1] 886				
Iran	C	120					
Iraq	C	83	182	92	20	35	
Palestine	C	18	13	11	1		
Syria and Lebanon	C	3	8	1			
EUROPE							
Bulgaria	C	235					
Germany	C	800					
Hungary	C	120	200	47	30	39	
Irish Free State	C		7	9	3		
Portugal	C				1		2
Rumania	C	1,207	2,054				[2] 1,212
Slovakia	C	70	47		[3] 60		15
Spain	C	83	56		4	1	
Turkey	C	436	436				
NORTH AMERICA							
Guatemala	C	172	146				
Jamaica	C	5	1				
Mexico	C	306					
Puerto Rico	C	2					
SOUTH AMERICA							
Chile	C	68	1				
Ecuador	C	53	21	4	5		1
Peru	C	5					
Venezuela	C	1					
OCEANIA							
Australia	C	17	3	4	3	1	
Hawaii Territory	C	4	2		1		1

[1] Includes 33 cases in Baluchistan and 853 cases in Kashmir State, India.
[2] For the month of April.
[3] For 3 weeks.

YELLOW FEVER

[C indicates cases, D, deaths]

Place		January-February 1943	March 1943	April 1943—week ended— 3	10	17	24
AFRICA							
Belgian Congo							
Stanleyville	D		1				
Yanonge	C	1					
SOUTH AMERICA							
Colombia: Intendencia of Meta	D	2					

DEATHS DURING WEEK ENDED MAY 15, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended May 15, 1943	Correspond ing week, 1942
Data for 88 large cities of the United States:		
Total deaths	9,176	8,165
Average for 3 prior years	8,178	
Total deaths, first 19 weeks of year	185,655	168,764
Deaths under 1 year of age	629	529
Average for 3 prior years	512	
Deaths under 1 year of age, first 19 weeks of year	12,875	10,684
Data from industrial insurance companies:		
Policies in force	65,527,004	64,979,848
Number of death claims	14,845	11,054
Death claims per 1,000 policies in force, annual rate	11.8	8.9
Death claims per 1,000 policies, first 19 weeks of year, annual rate	10.6	10.1

COURT DECISION ON PUBLIC HEALTH

Kerato-conjunctivitis—held compensable under workmen's compensation act.—(California Supreme Court; *Bethlehem Steel Co.* v. *Industrial Accident Commission et al.*, 135 P.2d 153; decided March 19, 1943.) The petitioner company brought a proceeding to review awards of compensation made by the State industrial accident commission under the workmen's compensation act to a number of petitioner's employees who had contracted kerato-conjunctivitis. The commission found that each of the employees contracted this contagious disease while working in the petitioner's shipyards, thereby sustaining an injury arising out of and in the course of his employment.

At the outset the Supreme Court of California said that it was well established that compensation was not due merely for injury caused by disease contracted by an employee while employed, but that (*a*) the injury must arise out of the employment and, where the injury is by disease, there must exist the relation of cause and effect between the employment and the disease, and (*b*) it must affirmatively appear that there exists a reasonable probability that the employee contracted the disease because of his employment. Further, said the court, it must be shown that the disease contracted was not merely a hazard of the community but that the employee was subjected to some special exposure in excess of that of the commonalty. In the absence of such showing, the employee's illness can not be said to have been proximately caused by an injury arising out of his employment or by reason of a risk or condition incident to the employment. "The employee's risk of contracting the disease by virtue of the employment must be materially greater than that of the general public, i. e., the injury must be a natural or a reasonably probable result of the employment or of the conditions thereof."

After reviewing the evidence, the court said that it was quite convincing that "the disease in the community outside of the shipyards was of much less proportion compared to the population." The finding of the commission that the epidemic in the shipyards constituted a special exposure in excess of that of the commonalty could not be disturbed.

With respect to whether the disease could be said to have been proximately caused by and to have arisen out of the employment by reason of such exposure, the court observed that all the claimants testified that they received treatment at the company's first-aid station for several specified eye injuries and irritations and that within a few days after treatment kerato-conjunctivitis developed. The court's conclusion, after considering the evidence, was that the question whether the disease arose out of and in the course of employment was one of fact for the commission's determination and that there was for application the time-honored rule that in the case of a conflict of evidence the commission's finding could not be disturbed where there was substantial evidence to support it.

The awards were affirmed.

x

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 58 JUNE 4, 1943 NUMBER 23

IN THIS ISSUE

The Effect of Fluorine on Dental Caries

CONTENTS

Public Health Reports

Vol. 58 • JUNE 4, 1943 • *No. 23*

THE CARIES-FLUORINE HYPOTHESIS AND A SUGGESTED STUDY TO TEST ITS APPLICATION [1]

By DAVID BERNARD AST, *Assistant Director for Oral Hygiene, Division of Maternity, Infancy and Child Hygiene, New York State Department of Health*

INTRODUCTION

The purpose of this thesis is to present the story of dental caries as it exists today, to present its public health significance, and to suggest a study for its control. It is proposed to introduce nontoxic doses of sodium fluoride into public drinking waters to test the fluorine-caries hypothesis, which points to an inverse ratio of caries to fluorides present in drinking water (*1*). If this hypothesis can be determined affirmatively, it will indeed revolutionize our thinking and our approach to the solution of the dental caries problem. With conclusive positive evidence, it may be possible to effect mass protection and not have to depend on the individual to do anything about it. By deliberately treating public water supplies with effective yet nontoxic doses of fluoride salts, daily protection would be afforded without the public being aware of it. The possibilities of such findings fairly stagger the imagination when the extent of dental caries today, the economic problem involved in an attempt to correct accumulated defects, and the difficulties encountered in getting persons to dentists for treatment are considered.

As far back as we can go in history, including archaeological studies dating from the Danish Stone Age, we find that human beings have been subject to the ravages of dental disease. Bremner (*2*), in his Story of Dentistry, states: "Decay of human teeth from ancient times has been found in so many places that it is legitimate to doubt whether there ever was an epoch when the human species was not cursed with toothache."

The papyrus of Ebers (*3*), the most ancient of all known works on medicine, written about 37 centuries B. C., mentions dental diseases

[1] A thesis submitted in partial fulfillment of the requirements for the Degree of Master of Public Health, University of Michigan, 1942.

and therapeutic measures for their cure. In 2700 B. C., (*4*) the Chinese Emperor, Houang-ty, founder of medicine, wrote about dental caries and indicated that worms were the causative agent. This celebrated work refers to toothache as ya-tong, and reveals nine different varieties. Yasuhori Tambu (*5*), in 892 B. C., wrote Isinho, which explained the worm theory of dental disease. It was not until about 400 B. C., when Hippocrates introduced the humeral theory to explain disease in the human body, that the worm theory was questioned. Hippocrates (*6*) included diseases of the teeth along with other human ailments. In the second century A. D., Galen (*7*) associated dental disease with nutritional deficiencies.

Following the fall of the Roman Empire through the Dark Ages superstition once more took hold and the worm theory again came into prominence and remained until the eighteenth century when men like Pierre Fauchard began to doubt it. In more recent times the writings of W. D. Miller (1885) (*8*) and G. V. Black (1886) (*9*), along with those of a number of present-day authors, give a picture of accumulated dental defects which is truly disheartening. Studies made on children of preschool age by McCall (*10*), on school children by Klein, Palmer, and Knutson (*11*), on adolescents and adults by the Economics Committee of the American Dental Association (*12*) indicate that dental disease is practically universal, affecting the entire population, starting as early as 2 years of age and continuing throughout life. Klein and Palmer (*13*) have shown the disproportionate rate of dental corrections to yearly increments which accounts for the accumulated problem today. Of even more striking significance and gaining much publicity through newspapers, magazine articles, lectures, and actual contact with the individuals involved is the report on physical defects responsible for the rejection of about 50 percent of the Nation's young manhood called up for the Selective Service in 1941. Of 2,000,000 men examined, 900,000 were rejected for physical and mental disabilities, the leading cause for rejections being dental defects (*14*).

Cause of rejection:	*Number of cases*	*Percentage*
Dental defects	188, 000	20. 9
Defective eyes	123, 000	13. 7
Cardiovascular diseases	96, 000	10. 6
Muscles—skeletal defects	61, 000	6. 8
Venereal diseases	57, 000	6. 3
Mental and nervous diseases	57, 000	6. 3
Hernia	56, 000	6. 2
Defects of ears	41, 000	4. 6
Defects of feet	36, 000	4. 0
Defective lungs, including tuberculosis	26, 000	2. 9
Miscellaneous	159, 000	17. 7
Total	900, 000	100. 0

Failure to meet the dental requirements assumes greater significance when we consider what these requirements are, as given in the United States War Department Mobilization Regulations MR1–9, issued August 31, 1940:

Paragraph 31. Classes 1–A and 1–B.

a. Class 1–A.

(1) Normal teeth and gums.

(2) A minimum of three serviceable natural masticating teeth above and three below opposing and three serviceable natural incisors above and three below opposing. (Therefore, the minimum requirements consist of a total of six masticating teeth and six incisor teeth.) All of these teeth must be so opposed as to serve the purpose of incision and mastication.

(3) *Definitions.*

(*a*) The term "masticating teeth" includes molar and bicuspid teeth, and the term "incisors" includes incisor and cuspid teeth.

(*b*) A natural tooth which is carious (one with a cavity), which can be restored by filling, is to be considered as a serviceable natural tooth.

(*c*) Teeth which have been restored by crowns or dummies attached to bridgework, if well placed, will be considered as serviceable natural teeth when the history and the appearance of these teeth are such as clearly to warrant such assumption.

(*d*) A tooth is not to be considered a serviceable natural tooth when it is involved with excessively deep pyorrhea pockets, or when its root end is involved with a known infection that has or has not an evacuating sinus discharging through the mucous membrane or skin.

b. Class 1–B.

Insufficient teeth to qualify for class 1–A, if corrected by suitable dentures.

Paragraph 32. Class 4.

a. Irremediable disease of the gums of such severity as to interfere seriously with useful vocation in civil life.

b. Serious disease of the jaw which is not easily remediable and which is likely to incapacitate the registrant for satisfactory performance of general or limited military service.

c. Extensive focal infection with multiple periapical abscess, the correction of which would require protracted hospitalization and incapacity.

d. Extensive irremediable caries.

All governmental agencies, Federal, State, and local, are becoming more interested in finding means to correct this morbid condition, which today is considered a public health problem. Sinai (*15*) defines a public health problem as:

(*a*) A condition or situation which is a widespread cause of morbidity or mortality, or both;

(*b*) concerning this situation there is a body of scientific knowledge which, if applied, would prevent, cure, or ameliorate that condition;

(*c*) that body of knowledge is not being applied.

In regard to the first part of the definition, there is ample evidence that dental disease affects large masses of the public. As to the knowledge regarding dental disease, several theories concerning the etiology and control have been advanced, such as *L. acidophilus*, diet

and nutrition, and fluorides. The most acceptable theory today is that relating to local environmental factors, especially *L. acidophilus*, but even the exponents of this theory admit that attacking the dental problem by curtailment of sugars and starches is well-nigh impossible with the American public. Today the only practical means of limiting the damage is periodic care by a dentist, starting as early as 2 years of age and continuing throughout life. However, economic factors and limitations of personnel, both in number and distribution, make this a remote possibility. Certainly the little that is known about the control of dental disease is not being applied when we learn that only about 25 percent of the people get anything like adequate dental care. It has also been estimated that a far higher percentage can afford adequate treatment but do not avail themselves of the opportunity (*16*). It seems unreasonable to argue that these people do not know the importance of good dental health, because so much has been said and written on the subject of late. It appears that inertia, together with a needless fear of dental treatment, keeps many persons from seeking care.

It is because of the widespread need, and the little likelihood of satisfying this need by present-day methods, that some other means more effective, less trying to the public, and within reasonable limitations of cost, have prompted the study proposed in this thesis.

CHAPTER I

THE FLUORINE-CARIES HYPOTHESIS

The low incidence of dental caries among persons living in areas supplied by waters containing fluorides has been reported from many sections of the world—long before it was known that fluorine in drinking water was the agent responsible for mottling of enamel. From studies in Japanese provinces, Masaki (*17*) reported that "the percentage of dental caries is comparatively small among those who suffer from this abnormality." In Argentina, Erasquin (*18*) found a lower incidence of caries among inhabitants of areas where mottled enamel is endemic. From Italy, Piperno (*19*) reported a similar condition. Ainsworth (*20*), in England, found in a group of 214 children, 5 to 15 years of age, living in areas where drinking water contained fluorides, that both the deciduous and permanent teeth showed a low incidence of caries. Whereas, only 12 percent of the deciduous and 7.9 percent of the permanent teeth of these children were carious, the averages for the rest of England were 43.3 percent in the deciduous and 13.14 percent in the permanent. Ainsworth also pointed out that, whereas the permanent teeth of the experimental group showed evidence of fluorosis, the deciduous teeth did not. Day (*21*), in India, also has reported a lower incidence of caries among those living in areas where fluorosis is endemic.

Of interest is the observation made by Chrichton-Browne (*22*) in 1892. He raised the question as to whether the marked deficiency of fluorine in the diet in England may be responsible for the high rate of caries there.

In this country, Eager (*23*), in 1901, was perhaps the first to report on this condition. While examining Italian emigrants from Naples and its environs, he noted a peculiar dental defect known as "Denti di Chiaie." According to Eager, "The etiology seems to be connected with volcanic fumes or the emanations of subterranean fires, either by fouling the atmosphere or forming a solution in the drinking water."

Black and McKay (*24*), in 1916, were the first to make a thorough study of the condition among the inhabitants of this country. They examined groups of children in the Rocky Mountain section where local dentists reported that mottled enamel was prevalent. In this first report Black said, "As to caries, the teeth of these children compare favorably with those of other communities where endemic mottled enamel is unknown. * * * But when teeth do decay, the frail condition of the enamel makes it extremely difficult to make good and effective fillings. For this reason, many individuals will lose their teeth, though the number of carious cavities is fewer than elsewhere."

McKay (*25*) in 1929, made similar observations and took issue with the accepted theory that defective enamel predisposed a tooth to caries. He pointed out that mottled enamel is perhaps "the most poorly constructed enamel of which there is any record in the literature of dentistry," and yet these mottled enamel teeth do not show any greater liability to decay than do normally calcified teeth. In fact, this writer feels that McKay was rather conservative in his analysis of his figures. The figures given by McKay may be interpreted to show that there was less caries among the poorly calcified mottled teeth than in those normally calcified. Dean (*26*), of the United States Public Health Service, has compiled certain of McKay's data in table 1.

TABLE 1.—*Variation in prevalence of dental caries in normal and mottled enamel teeth of three endemic areas, according to McKay*

Locality	Number of children examined	Total number of permanent teeth examined	Number of teeth examined and percentage with dental caries				
			Teeth	All teeth		Molar teeth	
				Number examined	Percent carious	Number examined	Percent carious
Towner, Colo. (population 154, 1930).	[1] 55	1,264	Normal	879	11	254	36
			Mottled enamel	385	9	101	33
Bruneau, Idaho (population 481, 1930).	[1] 54	1,142	Normal	356	16	126	46
			Mottled enamel	[2] 797	8	218	29
Pima Indian School, Sacaton, Ariz. (population unstated).	[1] 78	2,178	Normal	283	22	99	57
			Mottled enamel	1,895	14	529	45

[1] Age, sex, color, continuity of residence, and constancy of exposure to the mottled enamel-producing waters are not recorded in the report.

[2] Presumably, 11 deciduous teeth were included in this total (797), all other teeth referred to are apparently permanent teeth.

Bunting, Crowley, Hard, and Keller (*27*) were perhaps the first to investigate the dental caries problem in areas where mottled enamel is endemic. This study was made in 1928 at Minonk, Ill. It was observed there that the extent and activity of dental decay was decidedly limited among the children in the mottled enamel areas. "In regard to the prevalence of dental caries among the children, the percentage of those affected was about the same as would be found in any community, but although caries occurred in the mouths of most children, the extent and activity were remarkably limited. The great majority of cavities consisted of small pit and fissure lesions in the molars, and seldom did caries extend beyond that stage. In this respect, the behavior of dental caries in the mouths of these children is distinctly different to that which usually occurs." While the causative factor of mottled enamel had not been established at this time, this group of investigators stated, "There may be some principle in the drinking water which either inhibits the activity of dental caries or protects the teeth from injury."

It was McKay (*28*) who first really associated the etiology of this condition with something in the drinking water. In 1927 he visited areas around Naples and observed a correlation existing between those manifesting signs of mottled enamel and their supply of drinking water from wells sunk in ancient lava flow. He also observed that in Pozzuoli, where dental fluorosis had previously been reported endemic, no new cases developed after a change in the water supply.

The most interesting and conclusive contribution made by McKay (*29*) was his study in Oakley, Idaho, where in 1925 he recorded an incidence of 100 percent dental fluorosis. Fully convinced that this condition was caused by something in the drinking water, he persuaded the community to change its source of water and to obtain its supply from a nearby area where no mottling had been found. After 8 years another survey was made of the permanent teeth of all children born in Oakley after the change had been effected, and this examination showed no mottling. A chemical analysis of the first and second sources of drinking water made some time later showed 6 p. p. m. of F. in the former, and 0.5 p. p. m. of F. in the latter.

While the causative agent of fluorosis was not determined until 1931, Gautier and Clausmann (*30*) demonstrated a high fluorine content in the water and gases in volcanic areas around Naples in 1913 and 1914. However, at that time no attempt was made to correlate these findings with the "Chiaie" teeth.

In 1931 three independent studies demonstrated that fluorine was the etiologic factor in dental fluorosis. Churchill (*31*) found 2 to 13.7 p. p. m. F. in water in endemic areas where mottling was observed. Smith, Lantz, and Smith (*32*) confirmed Churchill's finding and demonstrated it experimentally with white rats. In the same year Balozet and Velu (*33*) made similar observations in the rock phosphate areas of North Africa.

Dean, in a series of papers, was the first to correlate in a statistical manner the incidence of dental caries with the fluorine content of the drinking water. His epidemiological studies have been most thorough, and the evidence points strongly to the accuracy of the hypothesis that there is an inverse ratio of caries to fluorine found in drinking water. In selecting communities for comparable studies, he was careful to control, as far as possible, all variable factors with the exception of the fluorine content of the water supply. He considered such variables as climate, days of sunshine, latitude, economic status, diet, age, sex, color, and nativity, and, as far as possible, employed the same examiners to negate that variable factor.

Dean's studies (*34*) in 1938 revealed that in various areas of endemic fluorosis in the West and Middle West, there were more caries-free children than in communities where there was little or no fluorine in the drinking water. This limited immunity seemed operative with respect to the deciduous teeth as well as the permanent teeth. Studying a large number of children in South Dakota, Colorado, and Wisconsin, he found that the severity of dental caries was low in areas of mottled enamel. In this paper he suggests the control of dental caries by control of the water supply with a minimal threshold of safety of approximately 1 p. p. m. of F.

In 1939 Dean et al. (*35*) reported a study of four cities in Illinois. In Galesburg and Monmouth, where the water contained 1.8 and 1.7 p. p. m. fluorine, respectively, the number of carious permanent teeth per 100 children was 201 and 205, respectively. In Macomb and Quincy, where the water contained only 0.2 p. p. m. fluorine, the rates were 401 and 633 per 100 children, respectively. An interesting finding of this study was that in areas of fluorosis the eight incisor teeth showed little or no interproximal decay. The 2,318 surfaces examined in Galesburg and Monmouth showed only 0.59 carious lesions per 100 surfaces, whereas in Macomb and Quincy, in 2,814 surfaces examined, there were 8.9 carious lesions per 100 surfaces.

TABLE 2.—*A summary of the incidence and amount of dental caries in selected 12- to 14-year-old white children of 4 Illinois cities*

City	Number of children examined	Children with one or more carious permanent teeth		Children with caries-free permanent teeth		Number of carious permanent teeth per 100 children			
						Age in years, last birthday			
		Number	Percent	Number	Percent	12	13	14	Total
(a) 696 CHILDREN WITH HISTORY OF CONTINUOUS USE OF PUBLIC WATER SUPPLY									
Galesburg	243	155	63 8	88	36 2	177	207	201	194
Monmouth	99	63	63 6	36	36.4	115	213	271	208
Macomb	63	54	85.7	9	14.3	315	422	367	368
Quincy	291	279	95 9	12	4.1	563	615	732	628
(b) 885 CHILDREN EXAMINED, INCLUDING THOSE IN (a) AND THOSE WHO HAVE CONTINUOUSLY USED THE CITY WATER SINCE 6 YEARS OF AGE; WATER HISTORY PRIOR TO 6, VARIABLE									
Galesburg	319	207	64 9	112	35 1	182	226	196	201
Monmouth	148	96	64 9	52	35 1	150	200	266	205
Macomb	112	96	85 7	16	14 3	346	411	453	401
Quincy	306	294	96 0	12	4 0	567	623	740	633

L. acidophilus studies also were made on the Galesburg and Quincy children, and the differences in oral *L. acidophilus* counts closely reflected the differences in dental caries. The percentage of lactobacilli counts over 30,000 was 3.4 times higher in Quincy than in Galesburg. There was no difference in the amylolytic activity of the saliva from the Quincy and Galesburg children.

Two studies were reported by Dean et al. in 1941. The first study (*36*) was concerned with the town of Bauxite, Ark., where the water supply had been obtained chiefly from deep wells found to have a fluorine content of about 14 p. p. m. This was one of the highest fluoride concentrations ever recorded in any known common water supply in this country. Twelve years previous to this study the town had changed the source of water supply from that of the deep wells to that of the nearby Saline River which was fluorine-free. Children who had used the deep-well water while their teeth were developing all showed mottled enamel. Children born subsequent to the water change were free from mottled enamel. In an examination of these children, it was found that those who had developed mottled enamel while using the high fluoride water and had used the fluorine-free water only for the past 12 years showed markedly less dental caries than a comparable group of pupils from Benton, Ark., who had used the fluorine-free water of the Saline River throughout their lifetime. Children born within a few years of the change in water supply showed practically no mottling but had a low caries experience. Children born latest, and thus having the shortest period of exposure to the risk, showed the highest caries index. *L. acidophilus* counts were consistent with the clinical findings in these groups. Teeth severely mottled showed no tendency to rampant caries, even though fluorine-free water had been used during the past 12 years.

Table 3.—*Dental caries findings in Bauxite (Ark.) elementary and high school pupils with and without mottled enamel and exposed to a fluoride-free water for the past 12 years, and in Benton (Ark.) high school pupils exposed to a fluoride-free water throughout life. (Survey made April 22–27, 1940)*

Age in years, last birthday	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A. 75 BAUXITE (ARK.) PUPILS WITH HISTORY OF CONTINUOUS USE OF COMMON WATER SUPPLY																
	26 pupils using fluoride-free water throughout life A-1			23 pupils of transitional group [1] A-2			26 pupils using fluoride-free water past 12 years only; high fluoride water previously A-3									Total
Number of pupils examined	3	15	8	11	7	5	3	3	6	6	7	1	0	0	0	75
First permanent molars																
Number (missing included)	12	60	32	44	28	20	12	12	24	24	28	4	----	----	----	300
Number showing dental caries experience	6	47	15	21	9	1	3	3	15	7	10	3	----	----	----	140
Percent showing dental caries experience		65			34		25		46		41					
									39							
Number of pupils, caries free	1	1	2	2	4	4	1	2	0	3	1	0	----	----	----	-----
Percent of pupils, caries free		15			43		50		25		13					
									27							
Approximate number of years of risk of exposure to caries		3.2			5.7						10.5					
Mottled enamel:																
Number of pupils with	0	1	0	0	1	0	3	3	6	6	7	1	----	----	----	-----
Degree of clinical affection (weighted average) [2]	0	0 1	0	0	0 2	0	2 7	3 7	3 8	3 2	3 7	4 0	----	----	----	-----
B. 50 BAUXITE (ARK.) PUPILS SHOWING A RELATIVELY MODERATE TO SEVERE TYPE OF MOTTLED ENAMEL. GROUP CONSISTS OF 26 OF "A-3" ABOVE AND 24 OTHERS WITH MINOR VARIATIONS IN CONTINUITY OF USE OF PUBLIC WATER SUPPLY																
Number of pupils examined							4	8	12	9	9	4	3	0	1	50
First permanent molars																
Number (missing included)							16	32	48	36	36	16	12	0	4	200
Number showing dental caries experience							3	12	32	11	17	7	0	----	1	83
Percent showing dental caries experience							31		51		37					
											42					
Number of pupils, caries free							2	3	0	4	1	2	3	----	0	15
Percent of pupils, caries free											30					
Approximate number of years of risk of exposure to dental caries											10 8					
Mottled enamel																
Number of pupils with							4	8	12	9	9	4	3	---	1	-----
Degree of clinical affection (weighted average) [2]							3 0	3 0	3 8	3 1	3.8	3 5	3 7	---	4 0	-----
C. 45 BENTON (ARK.) HIGH SCHOOL PUPILS WITH A HISTORY OF CONTINUOUS USE OF THE COMMON WATER SUPPLY (NO CHANGE OCCURRED IN BENTON WATER SUPPLY DURING LIFETIME OF THIS GROUP)																
Number of pupils examined							11	9	10	9	4	0	1	1	0	45
First permanent molars																
Number (missing included)							44	36	40	36	16	----	4	4	--	180
Number showing dental caries experience							30	27	20	33	13	----	0	1	---	124
Percent showing dental caries experience							71		70		58					
											69					
Number of pupils, caries free							1	1	3	0	0	----	1	0	---	6
Percent of pupils, caries free											13					
Approximate number of years of risk of exposure to dental caries											9 9					
Mottled enamel.																
Number of pupils with							0	0	-0	0	0	----	0	0	-	-----
Degree of clinical affection (weighted average) [2]							0	0	0	0	0	----	0	0	-	----

[1] The public water supply at Bauxite was changed from deep well to filtered river water in May 1928; the "transitional group" includes those pupils born within 1½ years of the change in water supply (a 3-year period covering 1½ years prior to the change and 1½ years subsequent to the change).

[2] The following weights were given to the diagnosis recorded for each individual: Normal, 0; questionable, 0.5; very mild, 1; mild, 2; moderate, 3; severe, 4.

The second study by Dean et al. (*37*) was made to determine the lowest concentration at which fluorine was effective in the reduction of the incidence of dental caries, and the extent of the magnitude of this inhibition. Eight suburban cities around Chicago were selected. Elmhurst, Maywood, Aurora, and Joliet had, respectively, 1.8, 1.2, 1.2, and 1.3 p. p. m. fluorine in their drinking water. Elgin was intermediate with 0.5 p. p. m., and Evanston, Oak Park, and Waukegan used fluorine-free water.

It is interesting to observe that in white children 12 to 14 years of age the total caries experience in Elmhurst, Maywood, Aurora, and Joliet does not quite equal the number of already filled teeth in the fluorine-free communities. The drinking water in Elgin, with 0.5 p. p. m. of fluorine, seems to have offered some freedom from caries to the school population, which is intermediate in nature. Bacteriological studies were carried out on 1,761 children in these cities. There were fewer negative salivas and more *L. acidophilus* counts of 30,000 and over in the fluorine-free cities than in the cities supplied with water containing fluorine. This ratio held true with more or less regularity throughout the series. The bacterial counts followed the difference in dental caries experience.

TABLE 4.—*Summary of the percentage incidence and dental caries experience, permanent teeth, in the 1,761 children for whom a single* L. acidophilus *count was made*

City	Number of children examined	Children showing dental caries experience	Children showing no dental caries experience	Dental caries experience, permanent teeth: Filled teeth (past dental caries) (a)	Teeth with untreated dental caries (b)	Extraction indicated (c)	Missing (d)	Total (a+b+c+d)
				(A) Number				
Elmhurst	154	112	42	220	147	7	7	381
Maywood	139	100	39	174	164	1	13	352
Aurora	340	255	85	360	556	7	34	957
Joliet	233	191	42	265	469	10	41	785
Elgin	250	223	27	529	536	7	41	1,113
Evanston	208	200	8	802	485	23	89	1,399
Oak Park	208	202	6	1,010	424	13	61	1,508
Waukegan	229	223	6	884	816	31	160	1,891
	Percent of total examined clinically			(B) Number per 100 children				
Elmhurst	90 6	72 7	27 3	143	95	4.5	4 5	247
Maywood	81.3	71 9	28.1	125	118	.7	9.4	253
Aurora	53.7	75.0	25.0	106	164	2 1	10.0	281
Joliet	52 1	82.0	18 0	114	201	4.3	17.6	337
Elgin	62 0	89.2	10.8	212	214	2 8	16.4	445
Evanston	81 3	96.2	3.8	386	233	11.1	42.8	673
Oak Park	63.2	97.1	2.9	486	204	6.3	29 3	725
Waukegan	54.1	97.4	2.6	386	356	13.5	69.9	826

TABLE 5.—*Summary of the percentage distribution of oral* L. acidophilus *in salivas from 1,761 school children in 8 suburban Chicago communities*

City	Distribution of children according to the number of *L. acidophilus* per cc. of saliva								
	Negative	Less than 100	100 to 1,000	1,000 to 3,000	3,000 to 12,000	12,000 to 21,000	21,000 to 30,000	30,000 and over	Total
	(A) Number								
Elmhurst	39	16	13	9	16	13	10	38	154
Maywood	35	20	14	10	17	8	6	29	139
Aurora	86	44	24	10	43	34	12	87	340
Joliet	61	22	20	6	24	26	12	62	233
Elgin	40	13	24	14	40	22	14	83	250
Evanston	19	13	19	2	28	29	11	87	208
Oak Park	24	14	13	14	27	19	6	91	208
Waukegan	21	13	13	6	27	15	9	125	229
	(B) Percent								
Elmhurst	25.3	10.4	8.4	5.9	10.4	8.4	6.5	24.7	100
Maywood	25.2	14.4	10.1	7.2	12.2	5.7	4.3	20.9	100
Aurora	25.3	12.9	7.1	2.9	12.7	10.0	3.5	25.6	100
Joliet	26.2	9.4	8.6	2.6	10.3	11.2	5.1	26.6	100
Elgin	16.0	5.2	9.6	5.6	16.0	8.8	5.6	33.2	100
Evanston	9.1	6.3	9.1	1.0	13.5	13.9	5.3	41.8	100
Oak Park	11.5	6.7	6.3	6.7	13.0	9.1	2.9	43.8	100
Waukegan	9.2	5.7	5.7	2.6	11.8	6.5	3.9	54.6	100

In 1942, Arnold, Dean, and Elvove (*38*) reported a study in which they examined the caries experience of 109 children, averaging 13 years in age, in the town of Garrettsville, Ohio. In 1939 a new well which contained 1.7 p.p.m. of fluorine was dug in the community. By mixing this water with wells which contained no fluorine, the tap water had an average concentration of 0.7 to 0.8 p.p.m. of F. The children showed an average caries experience which would be expected from a community using fluorine-free water. *L. acidophilus* counts were made during a 1-year period, eight separate saliva samples being collected from each child. The results showed that there was, if anything, an increase in high counts at the end of the year, suggesting no arrest of dental caries. However, the authors caution that the relatively unchanged counts may be the result of dental caries activity and lesions which had started prior to the change of water and which were still active. The experiment might indicate that exposure to low concentrations of fluorine over a number of years is required in order to produce beneficial results.

Studies on rats have been made by numerous investigators in an attempt to determine the effect of fluorine on caries. Miller (*39*), working on the hypothesis that the enzyme systems, capable of transferring the phosphate radical, are the important factors in the localized decalcification of the enamel, investigated the effects of small amounts of fluorides and iodoacetic acid added to food and water of rats placed on a caries-producing diet. He observed that both sodium fluoride

and iodoacetic acid added to the caries-producing diets for rats resulted in a very low incidence of dental caries compared with a group of rats on a diet similar in type but without sodium fluoride or iodoacetic acid.

Hodge and Finn (*40*) demonstrated that rats fed casein plus fluorine had from 60 to 70 percent less caries than groups fed powdered milk and plain casein. This observation somewhat negates the findings of Lilly (*41*) who attributed a decrease in rat caries to commercial casein in the diet. It is of interest to note that commercial casein was found to contain 0.2 percent of fluorine (*42*).

Cox et al. (*43*) observed that diets containing up to 40 p. p. m. of sodium fluoride fed to pregnant rats significantly reduced the incidence of dental caries in their offspring, when compared with control litters. An important point brought out by this investigation is that the only fluorine contained in the teeth of young rats is that which is derived from the mother. After the young rats were weaned, all rats used in the study were placed on the same low-fluoride, caries-producing diet. These data show that resistance to caries is inherent in the rat, presumably in the enamel.

McClure (*44*), in 1941, observed that the caries resistance of rats is correlated with the amount of fluorine in the diet; also that the fluorine content of the molar teeth of the experimental rats is changed in direct proportion to the amount of fluorine in the diet. However, it could not be determined from these experiments whether the action of fluorine in dental caries is local, systemic, or associated with tooth structure.

To eliminate the question of local action of fluorine, Arnold and McClure (*45*) administered subcutaneous injections of sodium fluoride to rats, and the dental caries experiences of the injected rats were compared with those of a control group and a group receiving 10 p. p. m. F. in drinking water. The results of this investigation indicated that:

1. Fluorine, when injected subcutaneously, did not reduce the susceptibility of rats to induced dental caries. This group had as much dental caries as either the control group or the group receiving 10 p. p. m. F. in the water. The investigators were led to assume that the action of fluorine in reducing dental caries in rats is possibly more closely related to local or oral factors than to systemic influence.

2. The fluorine content of the enamel and dentin of the incisor and molar teeth of the rats was increased by both the subcutaneous injections of sodium fluoride and by feeding water containing 10 p. p. m. F. This led to the assumption that the composition of enamel and dentin of molar teeth of rats may be altered by way of the blood stream from within the tooth, even after the crowns of these teeth have erupted in place.

Chapter II

TOXICOLOGY OF FLUORINE

Since fluorine is the twentieth most common element making up the composition of the earth's surface, it is not surprising to find endemic fluorosis so prevalent throughout the world. Over 75 reports in the literature tell of its widespread distribution in varying degrees on every continent of the world.

The existence of the element fluorine as a constituent of the teeth was first observed by Morichini (*46*) in 1802 while analyzing fossil teeth. Gay-Lussac and Berthollet (*47*) in 1805, however, were the first to show that fluorine was found as an element in normal human enamel.

It has been only within a comparatively few years that analytical methods for fluorine determination have been perfected. Among the most reliable figures are those given by Armstrong and Brekhus (*48*), who found that the fluorine content of the enamel from sound teeth was .0111 percent, and the fluorine content of dentin from sound teeth .0169 percent.

Gautier and Clausmann (*49*) observed that teeth had a higher content of fluorine than any other body tissue. This observation led them to assume that fluorine was a necessary element in the body By dividing the organs of the body into three groups according to their metabolic activity, they found that those organs most active had the least amount of fluorine, and those least active had the most fluorine. The fluorine, they claimed, became fixed in the tissue and acted as the stabilizer and hardener of that tissue. Although the physiological value of this element was purely speculative from their viewpoint, the concept has, nevertheless, received some verification in the light of present findings relative to the role of fluorine in the inhibition of dental caries and the retardation of the production of rickets in rats fed a rachitogenic diet. Fluorine is as yet the only variable constituent in sound and carious teeth. It has been suggested by Trebitsch (*50*) that the hardest apatite, fluorapatite, occurs in dental enamel, and that the hardness of teeth depends upon the presence of apatite crystals. Thus there is some support for the assumption that fluorine is an essential element to the human body.

Sharpless and McCollum (*51*), in 1933, feeding rats a diet free of fluorine, could see no harmful effects from the omission of this element from the diet. However, there is some doubt as to whether this element was totally absent, and since the percentage of fluorine necessary for the body is extremely minute, this experiment is of questionable value.

Although mottled enamel produced by ingestion of more than 1.0 p. p. m. of fluorine during the development of the dentition is the

first objective indication of chronic fluorine poisoning, other effects of fluorine intoxication have been reported in the literature. These reports deal mainly with the intake of large doses and are noted chiefly in animal experimentation and among workers in cryolite mines and phosphate plants. The quantities reported are very much higher than those that are suggested in this paper for study purposes to test the caries-fluorine hypothesis.

That fluorine is acutely toxic was discovered fortuitously by the chemists Thenard and Davy (*52*) who became seriously ill when they breathed hydrofluoric acid vapors, and by Louyet and Nickels (*53*) who met death from the same cause. Today, it is well known how acutely toxic fluorides may be. Fatal doses have been reported as low as 0.2 gm. of sodium fluosilicate, but the usual lethal dosage runs from 5 to 15 gm. of sodium fluoride (*54*).

The consideration of chronic fluorosis has been directed for the most part to the skeletal structures, endocrine glands, and enzymatic processes of the body. Certainly the literature to date justifies the statement that reports are quite confusing regarding some aspects of chronic fluorine toxicosis, and further work in this field is warranted and should be encouraged.

The source of chronic fluorine toxicosis for human beings has been considered as existing in the United States principally in the drinking water. It has been stated (*55*) that the fluorine content of foods appears to play only a minor role in the production of mottled enamel, and although foods may possess a large quantity of fluorine, they have not been associated with mottled enamel unless there is an accompanying source of drinking water containing fluorine. Recent evidence offered by Sognnaes (*56*) is not in agreement with this statement. Evidence of mottled enamel was found on the island of Tristan di Cunha, where the drinking water contained only 0.2 p. p. m. of fluorine. The inhabitants, however, subsisted mainly on fish, which are known to have a high fluorine content. It may be necessary to change our concept of the importance of flourine in foods, especially in nontoxic doses, as related to the inhibition of dental caries.

Ingested fluorine is excreted in the urine, and there appears to be, according to Machle (*57*), a normal urinary fluorine secretion of approximately 1 mg. per liter of urine. Where the fluorine content of the drinking water is very high, there is a direct correlation between the fluorine ingested and the amount excreted in the urine. Fluorine is also stored in the body, in the bones, and in the teeth. Sonntag (*58*) found an increase of fluorine in the bones and teeth when animals were fed sodium fluoride.

In a consideration of the chronic toxicity of fluorine, particular attention should be given to the hard tissues and supporting structures

of the body, since it is in these tissues and structures that the first and probably the most severe indications of fluorosis are seen. Moller and Gudjonsson (*59*), Roholm (*60*), and others have reported that cryolite workers, after long periods of continued exposure to fluorine, developed a disease called osteosclerosis. Their diagnoses were made clinically, radiographically, and from autopsy material. They characterized the disease as a calcification of the ligaments and osteophytic outgrowths on various bones, and almost complete synostosis of the various joints which sometimes produced complete ankylosis of the vertebral column. According to Shortt et al. (*61*), the kidney function also was impaired in the majority of cases examined in an area in India where mottled enamel was prevalent.

Roholm (*62*) describes osteosclerosis as a disease which attacks bone and is characterized pathologically as a diffuse type in which the pathological formation starts both in the periosteum and endosteum. The capita densifies and thickens; the spongiosa trabeculae thicken and fuse together. The medullary cavity decreases in diameter and new bone forms from the periosteum. There is also calcification of the ligaments. All signs of bone destruction are absent from the syndrome. Cases of osteosclerosis have been reported by Speder (*63*) and by Gaud (*64*) among men in phosphate areas of North Africa, and by Bauer, Bishop and Wolff (*65*) and by Wolff and Kerr (*66*) among phosphate fertilizer workers in the United States. These workers have received considerable doses of fluorine, and they present a serious problem. However, no clinical reports from areas supplied by water containing 1 p. p. m. or slightly more of fluorine offer any evidence that these pathological changes exist. (Bauxite, Ark., reported 14 p. p. m.)

Studies within areas in the United States where the fluorine content of the water supply is comparable with concentrations which the study in this paper suggests, offer very little conclusive evidence of any changes other than mottled enamel.

Blue (*67*) made a clinical study of the general physical development of children in Oklahoma living in normal areas and in areas where mottled enamel is endemic. The finding of a greater number of fractures, rickets, and dental deformities in the mottled enamel areas indicated to him a retarded physical development. This was purely a clinical study and lacks confirmation, since no calcium or phosphorous studies were undertaken on these children. Calcium and phosphorous balance studies conducted by Lantz, Smith, and Leverton (*68*), and by Smith, Lantz, and Smith (*69*) on girls who lived in endemic areas of Arizona revealed a normal assimilation of these elements.

Capizzano et al. (*70*) observed definite bone changes in endemic areas of Argentina. However, their number of cases was small, and other factors may have played a secondary part. Their observations warrant further investigation to determine whether these alterations hold true generally.

Many investigators have pointed out that fluorine acts upon various endocrine glands of the body to alter their metabolism. More emphasis has been placed, with some justification, upon the thyroid gland. Although the evidence for alteration in thyroid structure in experimentally produced fluorosis in animals is conflicting, and there is at present no general agreement, it is highly possible that some correlation, as yet unproved, will come to light.

Goldemberg (*71*) reported beneficial results from the use of sodium fluoride in the treatment of hyperthyroidism. It is his contention that excess fluorine may cause endemic goiter. Phillips (*72*) was unable to confirm Goldemberg's findings in experimental animals. May (*73*), in 1935, reported that the administration of fluorine produced epithelial changes in the thyroid gland and altered staining reaction of the colloid. Having experimented with over 800 patients he advocated internal fluorine therapy in the treatment of toxic goiter.

In 1941 Wilson (*74*) reported a study on the incidence of dental fluorosis in the goitrous and nongoitrous areas of rural sections of England. It was found that 103 children from the nongoitrous area showed no mottled enamel, while of 378 children examined in the goitrous area, 55 showed mottled enamel. This observation is offered as evidence that goiter is associated with fluorine in the water supply and lends weight to Goldemberg's conclusion. However, the association of the two factors may be coincidental and not related. Wilson and DeEds (*75*), in 1940, offered evidence that thyroid extract has a synergistic action in the production of fluorine intoxication. Certainly further studies are indicated on the effect of fluorine on thyroid glands.

McCollum et al. (*76*), in 1925, were the first to observe changes in incisors of rats from the incorporation of fluorine in the diet. By the addition of 226 p. p. m. of sodium fluoride to the stock diet, rats developed bleaching, mottling, friability, and overgrowth of the incisors. During the same year, Schultz and Lamb (*77*) reported changes among rats similar to those seen by McCollum and his coworkers. Many other investigators followed with like reports.

Chaneles (*78*), in 1929, made a microscopic study of the incisors of rats fed fluorine and noticed histologic changes which were more completely described in 1935 by Schour and Smith (*79*), who stated that the action of fluorine is directly upon the enamel forming cells and not through changes in blood calcium and phosphorous.

Although the condition now known as mottled enamel was first described in 1901 by Eager (*80*), who reported the dental abnormality among Italian emigrants, it was not until Black and McKay (*81*), in 1916, studied the abnormality thoroughly from both the gross and microscopic aspects that a complete picture of the appearance and pathology of mottled enamel was obtained. The etiology in 1916 was still unknown. Black (*82*) describes the macroscopic appearance of mottled teeth as showing opaque white or yellow through brown to black spots over the surface of the teeth. Some had dark bands running horizontally across the teeth, fading off to yellow or opaque white. However, the surface of the enamel appeared glazed and not penetrable to the tine of an explorer. The pigmentation appeared only on the outer one-third or one-fourth of the enamel. The dentin was described as normal. Histologically there appears to be a lack of inner cementing substance between the enamel rods. The discoloration is described as due to the deposition of a pigment, which Black called "brownin," in the interstices between the rods. The teeth were of normal shape. Mottled enamel was found to be endemic in certain regions, affecting 87.5 percent of all children reared in that area.

Churchill (*83*), in 1931, in an analysis of the water from these endemic areas found a high fluorine content of over 1 p. p. m. in the drinking water.

However, it remained for Smith et al. (*84*), in 1931, to prove definitely that the condition of fluorosis produced in rats was the same as mottled enamel in human beings. An investigation conducted in St. Davids, Ariz., disclosed that all persons reared in the area, and who imbibed the water during the time of tooth formation, showed mottled enamel. These investigators produced fluorosis in rats also by feeding them St. David's water. It is now known that 14 p. p. m. of fluorine in the drinking water is toxic to rats; as low as 1 p. p. m. is toxic to man. This is the first evidence of fluorine toxicity.

CHAPTER III

PROPOSED PLAN FOR A STUDY

The objective of this proposed plan for a study is to test the accuracy of the caries-fluorine hypothesis by deliberately placing nontoxic doses of sodium fluoride in the public drinking water of one community, and using a comparable community with fluorine-free water as a control. The practicability as well as the efficacy of such a plan, studied over a period of from 10 to 12 years, may thus be determined.

Much care must be exercised in the selection of study areas which should be comparable in as many essential factors as possible. Dean

and Arnold (*85*) spent over a month studying approximately 20 cities in the northern Illinois area before deciding on the 8 cities which were included in their studies in that State. This care is necessary in order to rule out variables which may possibly affect the end result. Such variables are (1) chemical composition of past and present water supply; (2) composition of population in regard to size, age, sex, color, nativity, economic status; (3) geographic and climatic considerations, including latitude, days of sunshine; (4) diet; (5) same person conducting the examinations; (6) past dental caries experience.

The term "dental caries experience" was introduced by Klein and Palmer of the United States Public Health Service who state that a "reconstitution of the caries experience in the permanent teeth of children may be accomplished with a fair degree of precision by totaling the mutually exclusive numbers of carious teeth (irrespective of the number of defects per tooth), the number of filled teeth, and the number of extracted teeth plus those indicated for extraction. The summation of these values gives a count of the number of permanent teeth showing evidence of having been attacked by caries." When it is desired to express the dental caries experience as a rate per 100 children, the sum of the four aggregates referred to (number of teeth with untreated dental caries, filled teeth, extracted teeth, and those indicated for extraction) is divided by the number of children examined and the quotient multiplied by 100.

Study areas should have populations of over 25,000 in order to have a sufficient number of children at the end of the 10- to 12-year period who have lived continuously for this period in the areas under investigation. Dean (*86*) has estimated that by the end of the study approximately 65 percent of the original group will probably either have moved away or will present discontinuities in exposure, warranting their elimination from the study. In Dean's investigations, records were eliminated of all cases with an absence from their cities of 30 days or more in any one year.

The period of investigation should extend over 10 to 12 years because the current theory is that the effective action of the fluorine takes place during the years of tooth development. Although calcification of the crowns of the permanent teeth (with the exception of the third molars) is completed when a child is between 7 and 8 years of age, eruption is not completed until he is 12 or 13 years old (*87*).

The two areas to be selected should have 0.1 p. p. m. fluorine or less in the public drinking water. One of these areas is to have the fluorine

content of its water raised to 0.8 p. p. m., and the other is to be used as a control.

After careful selection of the areas, dental examination with mouth mirror and sharp explorer should be made of all children, preschool and school age (through age 14), in both the control and study areas. These examinations should be made annually throughout the decade or more of investigation. Also, the examinations throughout the study should be made by the same dentist because of the marked variation in diagnosis of small carious lesions, pits, and fissures by different dentists.

Bacteriologic examinations for *L. acidophilus* in the saliva of the children under study should be made periodically. These findings may serve as a useful index of caries activity. Jay (*88*) has demonstrated a correlation of high counts of *L. acidophilus* and active caries. Other investigators (*89*, *90*, *91*) have made similar observations.

A record card suitable for punch card machine analysis is suggested, similar to the one used by the United States Public Health Service in its Illinois study in 1941. This form allows for recording, in addition to the general history of the patient, the past and current caries experience of the primary as well as the permanent teeth, special references to the first permanent molar and the incisors, *L. acidophilus* counts, and sufficient history to determine continuity of exposure to the public water supply.

ADDITION OF SODIUM FLUORIDE TO THE PUBLIC WATER SUPPLIES

A dose of 0.8 p. p. m. of fluorine represents a dose of 1.77 p. p. m. in terms of sodium fluoride. This dosage would necessitate the addition of 14.7 pounds of sodium fluoride per million gallons of water. This small dose of sodium fluoride may be added to public water supplies through the use of one of several available types of equipment. The soluble chemical may be dissolved in a solution tank, and then applied in measured volumes through the use of a constant level box and calibrated orifice, identical to equipment used for applying alum solutions. In other instances, water under pressure may be treated through the use of small chemical pumps which are capable of being adjusted to apply known volumes of sodium fluoride solution. Possibly the simplest equipment of this nature would be one of the several makes of chemical feeders designed for applying sodium hypochlorite solution for disinfection purposes.

There will be no interference between the two procedures of chlorination and the addition of sodium fluoride to the water supply. The

sodium fluoride should, however, be added to the alum-treated water after filtration, because the coagulant is likely to remove more or less of the added fluoride, and it is desired that the filtered water, ready for consumption, contain 0.8 p. p. m. fluorine.

There should be no difficulty in the application of sodium fluoride to public water supplies in view of the fact that small, constant doses would be adequate. Laboratory control would therefore be restricted to the periodic examination of samples of raw water, and of the treated water for fluoride content, so that the actual dose applied could be subject to appropriate checking.

CONCLUSION

All of the early studies on fluorine were concerned with toxic doses and the resultant mottling of the enamel. The chief problem to be solved, following these findings, was that of eliminating fluorine from the public drinking water.

As these studies progressed, the relationship of a low caries rate to the fluorine content of water became evident, and this discovery opened up a field of tremendous importance to those in public health who are trying to solve the problem of dental caries.

With investigations to date indicating the apparent safety of small doses such as 1.0 p. p. m. fluorine in water, further experimentation with this threshold dose or less is warranted in order to test the efficacy and practicability of using this element universally, under strict control, to reduce the incidence and ravages of dental caries.

ACKNOWLEDGMENTS

The writer expresses his indebtedness and appreciation to:

Dr. H. Trendley Dean, dental surgeon, United States Public Health Service, for counsel and encouragement to institute the study embodied in this thesis.

Mr. Charles R. Cox, chief, Bureau of Water Supply, Division of Sanitation, New York State Department of Health, for advice in planning for the treatment of a public water supply.

Dr. Sidney B. Finn, senior dentist, Division of Maternity, Infancy and Child Hygiene, New York State Department of Health, for assistance in the collection of reference material.

Dr. Kenneth A. Easlick, assistant professor of public health dentistry, School of Public Health, and assistant professor of operative dentistry, School of Dentistry, University of Michigan, and to Dr. Phillip Jay, assistant professor of oral pathology, School of Dentistry, University of Michigan, for assistance in the preparation of this thesis.

REFERENCES

(1) Dean, H. T.: Endemic fluorosis and its relation to dental caries. Pub. Health Rep., 53: 1443 (Aug. 19, 1938).
(2) Bremner, M. D. K.: The Story of Dentistry. Dental Items of Int. Pub. Co., Inc., Brooklyn, N. Y., 1938. 211 p.
(3) Guerini, V.: A History of Dentistry. Lea & Febiger, Philadelphia, 1909. 355 p.
(4) Idem.
(5) Taylor, J. A.: History of Dentistry. Lea & Febiger, Philadelphia, 1922. 238 p.
(6) Guerini, V., op. cit.
(7) Idem.
(8) Taylor, J. A., op. cit.
(9) Idem.
(10) McCall, J. O.: Incidence of dental caries in preschool children by ages and its significance. N. Y. J. Dent., 8: 286 (1938).
(11) Klein, H., Palmer, C. E., and Knutson, J. W.: Dental status and dental needs of elementary school children. Pub. Health Rep., 53: 751 (May 13, 1938).
(12) Economics Committee of the American Dental Association: A study of the dental needs of adults in the United States. Am. Dent. Assoc., 1940.
(13) Klein, H., and Palmer, C. E: The disparity between dental needs and dental care in school children of Hagerstown, Md., and environs. J. Am. Dent. Assoc., 28: 1489 (September 1941).
(14) Rowntree, Col. L. G: Medical aspects of Selective Service. N. Y. J. Dent., 12: 100 (March 1942).
(15) Sinai, N.. Lecture notes, course in public health administration. School of Public Health, University of Michigan, 1942.
(16) Cady, F. C.: Problem of dental care in the public health program. J. Am. Pub. Health Assoc, 30: 931 (1940).
(17) Masaki, T.: Shikwa gakuho, 36: 17 (1931).
(18) Erasquin, R.. Dientes veteados. Rev. Odont. (Buenos Aires), 23: 296 (1935).
(19) Piperno, A.: Dental Caries. Lancaster Press, New York, 1939. 132 p
(20) Ainsworth, N J.: Mottled teeth. Brit. Dent. J., 55: 233 (September 1933).
(21) Day, C. D. M: Chronic endemic fluorosis in northern India Brit. Dent J., 68: 409 (May 15, 1940).
(22) Chrichton-Browne, J.: Tooth culture. Lancet, 2: 6 (1892).
(23) Eager, J. M.: "Denti di Chiaie." Pub. Health Rep., 16: 2576 (Nov. 1, 1901).
(24) Black, G. V., and McKay, F. S.: Mottled teeth. Dent. Cosmos, 58: 129 (February 1916).
(25) McKay, F. S.: The establishment of a definite relation between enamel that is defective in structure, as mottled enamel, and the liability to decay. Dent. Cosmos, 71: 747 (1929).
(26) Dean, H. T.: Fluorine, mottled enamel, and dental caries. J. Pediat., 16: 782 (June 1940).
(27) Bunting, R. W., Crowley, M., Hard, D. G., and Keller, M.: Further studies of relation of bacillus acidophilus to dental caries. Dent. Cosmos, 70: 1002 (1928).
(28) McKay, F. S.: Mottled enamel. J. Dent. Res., 8: 353 (1928).
(29) McKay, F. S.: Mottled enamel: the prevention of its further production through a change of water supply at Oakley, Idaho. J. Am. Dent. Assoc., 20: 1137 (1933).
(30) Gautier, A., and Clausmann, P.: Le fluor dans l'organisme animal. Compt. rend. Acad. Sci., 157: 94 (1913).
(31) Churchill, H. V.: Occurrence of fluorides in some waters of the United States. J. Ind. & Eng. Chem., 23: 996 (1931).
(32) Smith, M. C., Lantz, E. M., and Smith, H. V.: The cause of mottled enamel, a defect of human teeth. Univ. of Arizona College of Agric., Agric. Exp. Sta., Tech. Bull. No. 32, 1931.
(33) Balozet, L., and Velu, H.: Bull. Soc. Path. Exot., 24: 848 (1931).
(34) Dean, H. T.: Endemic fluorosis and its relation to dental caries. Pub. Health Rep., 53: 1443 (Aug. 19, 1938).

(35) Dean, H. T., Jay, P., Arnold, F. A., McClure, F. J., and Elvove, E.: Domestic water and dental caries, including certain epidemiological aspects of *L. acidophilus*. Pub. Health Rep., 54: 862 (May 26, 1939).
(36) Dean, H. T., Jay, P., Arnold, F. A., and Elvove, E.: Domestic water and dental caries. I. Pub. Health Rep., 56: 365 (Feb. 28, 1941).
(37) Dean, H. T., Jay, P., Arnold, F. A., and Elvove, E.: Domestic water and dental caries. II. Pub. Health Rep., 56: 761 (Apr. 11, 1941).
(38) Arnold, F. A., Dean, H. T., and Elvove, E.: Domestic water and dental caries. IV. Pub. Health Rep., 57: 773 (May 22, 1942).
(39) Miller, B. F.: Inhibition of experimental dental caries in rat by fluorides and iodoacetic acid. Proc. Soc. for Exp. Biol. & Med., 39: 389 (1938).
(40) Hodge, H. C., and Finn, S. B.: Reduction in experimental rat caries by fluorine. Proc. Soc. for Exp. Biol. & Med., 42: 318 (1939).
(41) Lilly, C. A.: Lessened incidence of caries when casein replaces milk in coarse corn meal diet. Proc. Soc. for Exp. Biol. & Med., 38: 398 (1938).
(42) Hodge, H. C., Luce-Clausen, E. M., and Brown, E. F.: Fluorosis in rats due to contamination with fluorine of commercial casein. J. Nutrit., 17: 333 (1938).
(43) Cox, G. J., Matuschak, M. C., Dixon, S. F., Dodds, M. L., and Walker, W. E.: Experimental dental caries. IV. Fluorine and its relation to dental caries. J. Dent. Res., 18: 481 (1939).
(44) McClure, F. J.: Observations on induced caries in rats. J. Nutrit., 22: 391 (1941).
(45) Arnold, F. A., and McClure, F. J.: Observations of induced dental caries in rats. J. Dent. Res., 20: 457 (1941).
(46) Morichini, D.: Analisi dello smalto di un dente fossile di elefante e dei denti umani. Mem. Mat. Fis. Soc. Ital. Sci. (10), 1: 166 (1803).
Gay-Lussac, DeM., and Berthollet: Ann. de Chimie, 60: 258 (1805).
Armstrong, W. D., and Brekhus, P. J.: Possible relationship between fluorine content of enamel and resistance to dental caries. J. Dent. Res., 17: 393 (February 1938).
(49) Gautier, A., and Clausmann, P.: Le fluor dans l'organisme animal. Compt. rend. Acad. Sci., 157: 94 (1913).
(50) Trebitsch, F.: Ueber den fluorgehalt der zahne. Biochem. Zeitschr., 191: 234 (1927).
(51) Sharpless, G. R., and McCollum, E. V.: Is fluorine an indispensable element in the diet? J. Nutrit., 6: 163 (1933).
(52) McClure, F. J.: A review of fluorine and its physiological effects. Phys. Review, 13: 277 (1933).
(53) Idem.
(54) Greenwood, D. A.: Fluoride intoxication. Phys. Rev., 20: 582 (1940).
(55) McClure, F. J., op. cit.
(56) Sognnaes, R. F.: A condition suggestive of threshold dental fluorosis observed in Tristan di Cunha. J. Dent. Res., 20: 303 (1941).
(57) Machle, W. F.: Normal urinary fluorine excretion and the problem of mottled enamel. Dent. Cosmos, 78: 612 (1936).
(58) Sonntag, G.: Estimation of the fluorine content in the bones and teeth of normal and fluorine-fed dogs. Chem. Abst., 11: 2691 (October 1917).
(59) Moller, P. F., and Gudjonsson, S. V.: Massive fluorosis of bones and ligaments. Acta. Radiol., 13: 269 (1932).
(60) Roholm, K.: Fluorine Intoxication. H. K. Lewis & Co., Ltd., London, 1937. 327 p.
(61) Shortt, H. E., McRobert, G. R., Barnard, T. W., and Nayar, A. S. M.: Endemic fluorosis in Madras Presidency. Indian J. Med. Res., 25: 553 (1937).
(62) Roholm, K., op. cit.
(63) Speder, E.: L'osteopetrose de la fluorose phosphatique de l'Afrique du Nord. Bull. Soc. Radiol. Med. (France), 24: 200 (1936).
(64) Gaud, M., Charnot, A., and Langlais, M.: Le darmous humain. Bull. Inst. Hyg. Maroc., No. I–II (1934).

(65) Bauer, J. T., Bishop, P. A., and Wolff, W. A.: Pathologic changes in bone in chronic fluorine poisoning. Bull. Ayer Clin. Lab., Penn. Hosp., 3: 67 (1937).
(66) Wolff, W. A., and Kerr, E. G.: Composition of human bone in chronic fluoride poisoning. Am. J. Med. Sci., 195: 493 (1938).
(67) Blue, J. A.: Mottled enamel in Oklahoma Panhandle and its possible relations to child development. J. Oklahoma Med. Assoc., 31: 295 (1938).
(68) Lantz, E. M., Smith, M. C., and Leverton, R. M.: Calcium phosphorous metabolism of children with mottled enamel. J. Home Eco., 27: 236 (Apr. 9, 1935).
(69) Smith, M. C., Lantz, E. M., and Smith, H. V.: Further studies in mottled enamel. J. Am. Dent. Assoc., 22: 817 (1935).
(70) Capizzano, N., Toledo, R. P., Megy, F., and Valotta, J.: Osteopetrosis generalizada enfermedad endemica regional en la Republica Argentina. Rev. Med. y cien afines, 1: 15–24 (Aug. 30, 1939).
(71) Goldemberg, L.: Comment agiraient-ils therapeutiquement les fluorures dans le goitre exophthalmique et dans l'hyperthyroidisme. Semana Med., 39: 1659 (1932).
(72) Phillips, P. H.: Further studies on the effects of sodium fluoride administration upon the basal metabolic rate of experimental animals. Am. J. Physiol., 117: 155 (1936).
(73) May, W.: Antagonismus zwischen Jod und Fluor im organismus. Klin. Wschr., 14: 790 (1935).
(74) Wilson, D. C.: Fluorine in etiology of endemic goitre. Lancet, 1: 211 (1941).
(75) Wilson, R. H., and DeEds, F.: Synergistic action of thyroid on fluorine toxicity. Endocrinology, 26: 851 (1940).
(76) McCollum, E. V., Simmonds, E. V., Becker, J. E., and Bunting, R. W.: Effect of addition of fluorine to diet of rat on quality of teeth. J. Biol. Chem., 63: 553 (1925).
(77) Schultz, J. A., and Lamb, A. R.: The effect of fluorine as sodium fluoride on the growth and reproduction of albino rats. Science, 61: 93 (1925).
(78) Chaneles, J.: Effets de la fluorose chronique sur les dents des rats blancs et action des rayons ultra-violets. Compt. rend. de la Soc. Biol., 102: 860 (1929).
(79) Schour, I., and Smith, M. C.: Mottled teeth: an experimental and histologic analysis. J. Am. Dent. Assoc., 22: 796 (May 1935).
(80) Eager, J. M.: "Denti di Chiaie." Pub. Health Rep., 16: 2576 (Nov. 1, 1901).
(81) Black, G. V., and McKay, F. S.: Mottled teeth. Dent. Cosmos, 58: 129 (February 1916).
(82) Idem.
(83) Churchill, H. V.: Ocurrence of fluorides in some waters of the U. S. J. Ind. & Eng. Chem., 23: 996 (1931).
(84) Smith, M. C., Lantz, E. M., and Smith, H. V.: Univ. Arizona College of Agric., Agric. Exp. Sta., Tech. Bull. No. 32, 1931.
(85) Dean, H. T.: Personal communication. July 1942.
(86) Dean, H. T., op. cit.
(87) Kronfeld, R.: Dental Histology and Comparative Dental Anatomy. Lea & Febiger, Philadelphia, 1937. 195 p.
(88) Jay, P.: *Lactobacillus acidophilus* and dental caries. Am. J. Pub. Health, 28: 759 (1938).
(89) Arnold, F. A., and McClure, F. J.: A study of the relationship of oral *L. acidophilus* and saliva chemistry to dental caries. Pub. Health Rep., 56: 1495 (July 25, 1941).
(90) Collins, R. O., Jensen, A. L., and Becks, H.: Study of caries-free individuals. Is an optimum diet of a reduced carbohydrate intake required to arrest dental caries? J. Am. Dent. Assoc., 29: 1169 (July 1942).
(91) Kesel, R. G.: Etiology of dental caries. Paper presented at the 78th annual midwinter meeting of the Chicago Dental Society, Feb. 25, 1942.

INCIDENCE OF HOSPITALIZATION, MARCH AND APRIL 1943

Through the cooperation of the Hospital Service Plan Commission of the American Hospital Association, data on hospital admissions among about 8,000,000 members of Blue Cross Hospital Service Plans are presented monthly. These plans provide prepaid hospital service The data cover about 60 hospital service plans scattered throughout the country, mostly in large cities.

Item	March 1942	March 1943
1. Number of plans supplying data	62	64
2. Number of persons eligible for hospital care	8, 265, 931	9, 281, 942
3. Number of persons admitted for hospital care	73, 069	79, 699
4. Incidence per 1,000 persons, annual rate, during current month (daily rate × 365)	104.0	101.0
5. Incidence per 1,000 persons, annual rate for the 12 months ending March 31	107.0	108.1
	April 1942	**April 1943**
1. Number of plans supplying data	60	65
2. Number of persons eligible for hospital care	7, 932, 108	10, 003, 704
3. Number of persons admitted for hospital care	70, 444	85, 482
4. Incidence per 1,000 persons, annual rate, during current month (daily rate × 365)	107 9	108 9
5. Incidence per 1,000 persons, annual rate for the 12 months ending April 30	107.1	106.7

DEATHS DURING WEEK ENDED MAY 22, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended May 22, 1943	Corresponding week, 1942
Data for 88 large cities of the United States		
Total deaths	8, 847	8, 158
Average for 3 prior years	8, 215	
Total deaths, first 20 weeks of year	194, 888	177, 243
Deaths under 1 year of age	594	544
Average for 3 prior years	517	
Deaths under 1 year of age, first 20 weeks of year	13, 463	11, 262
Data from industrial insurance companies.		
Policies in force	65, 524, 713	64, 976, 942
Number of death claims	12, 886	11, 468
Death claims per 1,000 policies in force, annual rate	10 3	9 2
Death claims per 1,000 policies, first 20 weeks of year, annual rate	10 6	10.0

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 29, 1943

Summary

As compared with figures for the preceding week, reports for the current week show decreased incidence for all of the first nine diseases included in the following table with the exception of smallpox; but the current incidence of influenza, measles, meningococcus meningitis, poliomyelitis, and whooping cough continued above the corresponding 5-year (1938–42) median figures. Of these nine diseases, however, the cumulative totals for the first 21 weeks of the year for only measles, meningococcus meningitis, poliomyelitis, and whooping cough are above the corresponding median figures of the past 5 years.

The number of reported cases of meningococcus meningitis declined from 544 for the preceding week to 423 for the current week. Decreases were shown in all of the nine geographic areas except the Mountain States. States reporting more than 20 cases for the week (last week's figures in parentheses) are as follows: New York, 92 (89); New Jersey, 35 (41); Pennsylvania, 30 (39); Michigan, 27 (18); California, 22 (31).

Cumulative figures for the first 21 weeks of the year for other diseases reported currently (figures for the corresponding period of last year in parentheses) are as follows: Anthrax, 28 (33); dysentery, all forms, 6,008 (2,929); infectious encephalitis, 230 (175); leprosy, 10 (24); Rocky Mountain spotted fever, 70 (101); tularemia, 364 (395); endemic typhus fever, 967 (748).

Deaths registered in 89 large cities of the United States for the current week totaled 8,946, as compared with 8,856 for the preceding week, and a 3-year (1940–42) average of 7,741. The cumulative total for the first 21 weeks of the year is 204,172, as compared with 185,391 for the corresponding period of last year.

Telegraphic morbidity reports from State health officers for the week ended May 29, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–29,	Week ended		Median 1938–42
	May 29, 1943	May 30, 1942		May 29, 1943	May 30, 1942		May 29, 1943	May 30, 1942		May 29, 1943	May 30, 1942	
NEW ENGLAND												
Maine	1	0	0	---	1	---	81	62	106	3	3	0
New Hampshire	0	0	0	---	---	---	27	40	28	0	0	0
Vermont	0	0	0	---	---	---	224	290	140	0	0	0
Massachusetts	0	4	3	---	---	---	1,715	968	943	13	3	1
Rhode Island	0	0	0	---		---	60	200	133	9	0	0
Connecticut	0	0	1	4	2	1	473	400	397	12	4	1
MIDDLE ATLANTIC												
New York	13	13	20	[1] 10	6	6	4,081	776	2,181	92	9	5
New Jersey	3	1	7	10	1	4	2,513	601	708	35	2	1
Pennsylvania	8	9	17	1	1	---	1,658	1,143	1,143	30	7	7
EAST NORTH CENTRAL												
Ohio	17	6	9	17	9	7	792	309	309	8	0	1
Indiana	7	3	5	11	4	3	162	234	159	1	0	0
Illinois	27	23	23	4	15	15	1,700	287	287	16	0	0
Michigan [2]	4	1	3	2	---	2	4,315	450	667	27	0	1
Wisconsin	0	0	1	37	48	35	2,474	1,274	1,274	1	1	1
WEST NORTH CENTRAL												
Minnesota	3	2	1	---	---	1	647	514	254	4	1	0
Iowa	5	2	2	---	---	---	317	268	268	1	0	0
Missouri	1	10	7	---	1	4	208	189	189	13	3	0
North Dakota	0	0	0	40	4	2	1	18	75	1	2	0
South Dakota	0	1	1				61	53	37	0	0	0
Nebraska	0	1	1	6	1	1	63	258	258	0	0	0
Kansas	4	1	3	1	4	4	177	267	392	0	0	1
SOUTH ATLANTIC												
Delaware	0	0	0		---	---	59	20	13	2	0	0
Maryland [2]	6	5	4	5	1	1	221	300	165	14	7	1
District of Columbia	0	0	2	1		---	92	50	50	7	0	0
Virginia	2	2	6	81	75	57	186	167	325	[3] 11	9	2
West Virginia	2	3	3	9	4	[illegible]	51	22	32	4	0	1
North Carolina	8	3	6	4	2	3	310	557	715	18	0	1
South Carolina	2	3	5	221	146	146	94	141	118	4	0	1
Georgia	7	3	3	8	8	11	204	142	112	1	1	0
Florida	1	1	1	6	1	3	48	246	152	5	0	0
EAST SOUTH CENTRAL												
Kentucky	2	1	5	4	1	4	143	63	[illegible]	7	0	0
Tennessee	0	2	5	4	10	16	231	33	[illegible]	5	2	0
Alabama	3	7	7	13	17	28	67	10[illegible]	[illegible]	7	1	2
Mississippi [2]	2	5	4	---	---	---	---	---	---	5	3	1
WEST SOUTH CENTRAL												
Arkansas	3	4	4	7	27	27	75	108	108	3	1	0
Louisiana	2	1	1	1	9	7	19	79	27	0	1	1
Oklahoma	1	3	3	10	29	19	35	98	98	0	1	0
Texas	12	16	17	398	182	179	203	641	641	10	5	2
MOUNTAIN												
Montana	0	1	1	---	4	4	258	145	84	1	2	0
Idaho	0	0	0	---	---	---	53	63	49	10	0	0
Wyoming	0	0	0	18	36	---	110	55	55	0	0	0
Colorado	7	5	8	58	32	12	43[illegible]	203	231	2	1	1
New Mexico	0	1	2	1	2	2	22	23	70	0	0	0
Arizona	2	0	1	33	59	55	67	48	48	2	0	0
Utah [2]	0	0	0	7	5	3	134	978	389	2	1	0
Nevada	0	0	---	---	---	---	0	55	---	0	0	---
PACIFIC												
Washington	4	2	1	3	1	---	532	646	502	11	3	0
Oregon	3	0	2	14	6	10	137	135	135	4	0	0
California	15	6	11	33	55	55	679	5,312	734	22	8	1
Total	177	151	203	1,082	809	870	2[illegible],018	19,116	19,116	[3] 423	81	47
21 weeks	5,297	5,590	6,849	73,723	75,305	164,052	422,983	391,848	391,848	10,276	1,648	1,029

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended May 29, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42
	May 29, 1943	May 30, 1942		May 29, 1943	May 30, 1942		May 29, 1943	May 30, 1942		May 29, 1943	May 30, 1942	
NEW ENGLAND												
Maine	0	2	0	17	5	13	0	0	0	0	0	0
New Hampshire	0	0	0	11	7	4	0	0	0	0	0	0
Vermont	0	0	0	14	5	5	0	0	0	0	0	0
Massachusetts	0	0	0	465	181	181	0	0	0	3	2	1
Rhode Island	0	0	0	23	4	6	0	0	0	0	0	0
Connecticut	0	0	0	107	21	58	0	0	0	1	0	2
MIDDLE ATLANTIC												
New York	0	3	1	429	247	546	0	0	0	1	5	10
New Jersey	0	0	0	101	80	221	0	0	0	1	2	1
Pennsylvania	2	0	0	239	307	384	0	0	0	5	8	8
EAST NORTH CENTRAL												
Ohio	0	1	1	201	195	241	2	0	1	8	2	6
Indiana	0	0	0	19	39	87	2	0	1	1	2	2
Illinois	0	1	1	160	194	331	0	11	7	2	4	4
Michigan [2]	0	0	0	130	192	268	0	0	6	0	4	3
Wisconsin	1	1	0	317	135	149	0	3	8	1	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	45	52	73	0	0	4	0	2	0
Iowa	0	0	0	42	30	61	1	0	15	3	1	2
Missouri	0	0	0	58	40	40	0	1	4	0	5	2
North Dakota	0	0	0	5	5	6	1	0	1	0	0	0
South Dakota	0	0	0	3	10	7	0	0	4	0	0	0
Nebraska	0	0	0	8	13	13	0	2	2	0	0	0
Kansas	1	1	0	28	54	54	0	0	0	0	0	1
SOUTH ATLANTIC												
Delaware	0	0	0	4	17	6	0	0	0	0	0	0
Maryland [2]	0	0	0	49	53	39	0	0	0	3	9	3
District of Columbia	0	0	0	12	5	14	0	0	0	3	0	0
Virginia	1	1	0	25	7	15	0	0	0	1	4	4
West Virginia	0	1	0	13	24	25	0	0	0	1	0	4
North Carolina	0	0	0	15	14	12	1	0	0	1	1	3
South Carolina	0	1	1	5	2	5	0	0	0	0	0	3
Georgia	1	0	0	7	8	10	0	2	0	6	9	13
Florida	0	1	1	5	2	2	1	0	0	3	4	4
EAST SOUTH CENTRAL												
Kentucky	0	0	1	25	36	30	2	0	0	0	2	5
Tennessee	0	0	0	20	11	25	0	0	3	0	1	7
Alabama	0	1	1	9	5	6	0	0	0	1	4	1
Mississippi [2]	0	0	0	1	2	2	1	1	1	4	0	2
WEST SOUTH CENTRAL												
Arkansas	1	0	0	1	7	4	1	7	7	1	3	3
Louisiana	0	1	1	0	4	6	0	0	0	3	7	7
Oklahoma	0	0	0	4	12	13	0	0	3	1	4	6
Texas	6	0	0	43	36	24	6	1	4	6	8	8
MOUNTAIN												
Montana	0	1	0	14	10	14	0	0	0	0	0	0
Idaho	0	0	0	92	2	4	0	0	0	1	0	0
Wyoming	0	0	0	24	15	4	0	0	0	0	0	0
Colorado	0	0	0	58	10	20	0	2	2	1	0	2
New Mexico	1	0	0	7	0	7	0	0	0	0	1	1
Arizona	8	0	0	15	3	6	0	1	1	0	0	0
Utah [2]	0	0	0	32	20	15	0	0	0	1	0	0
Nevada	0	0	------	0	0	------	1	0	------	0	0	------
PACIFIC												
Washington	1	0	0	43	26	26	0	2	2	0	0	0
Oregon	1	0	0	16	2	9	0	1	1	1	0	2
California	9	3	3	129	83	117	0	0	1	4	6	6
Total	28	19	27	3,088	2,232	3,354	19	34	57	68	100	141
21 weeks	547	436	442	82,498	76,813	100,689	536	471	1,498	1,236	1,700	1,811

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended May 29, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Whooping cough: Week ended May 29, 1943	Whooping cough: Week ended May 30, 1942	Whooping cough: Median 1938–42	Week ended May 29, 1943: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENGLAND												
Maine	80	24	34	0	0	0	0	0	0	0	0	0
New Hampshire	5	3	3	0	0	0	0	0	0	0	0	0
Vermont	12	30	36	0	0	0	0	0	0	0	0	0
Massachusetts	118	196	161	1	0	1	0	2	0	0	0	0
Rhode Island	18	28	23	0	0	0	0	0	0	0	0	0
Connecticut	39	105	81	0	0	8	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	254	323	323	0	3	8	0	5	0	1	0	0
New Jersey	172	308	194	0	0	1	0	1	0	0	0	0
Pennsylvania	184	238	238	0	0	0	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	94	145	200	0	0	0	0	0	0	0	0	0
Indiana	44	68	32	0	0	0	0	0	0	0	0	0
Illinois	119	286	169	0	0	0	0	0	0	0	1	0
Michigan [2]	304	279	279	0	0	2	0	1	0	0	0	0
Wisconsin	212	184	125	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	86	20	40	0	2	1	0	0	0	0	1	0
Iowa	65	18	28	0	0	0	0	0	0	0	0	0
Missouri	4	8	21	0	0	0	0	0	0	0	0	0
North Dakota	1	9	9	0	0	0	0	1	0	0	0	0
South Dakota	6	0	4	0	0	0	0	0	0	0	0	0
Nebraska	20	0	7	0	0	0	0	0	0	0	0	0
Kansas	101	34	63	0	0	0	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	2	1	9	0	0	0	0	0	0	0	0	0
Maryland [2]	129	38	57	0	0	0	0	0	0	0	0	0
Dist. of Columbia	39	17	10	0	0	0	0	0	0	0	0	0
Virginia	116	89	66	0	0	0	20	0	0	0	0	0
West Virginia	26	8	29	0	0	0	0	0	0	0	0	0
North Carolina	238	165	250	0	1	0	0	0	0	0	1	2
South Carolina	97	74	62	0	0	0	0	0	0	0	0	2
Georgia	63	35	35	0	1	6	2	0	0	0	2	15
Florida	84	38	29	0	0	0	0	1	0	0	0	6
EAST SOUTH CENTRAL												
Kentucky	41	124	87	0	0	0	0	0	0	0	0	0
Tennessee	67	94	64	0	0	0	2	0	0	0	1	0
Alabama	51	35	44	0	0	0	0	0	0	0	0	8
Mississippi [2]				0	0	0	0	0	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas	51	32	33	0	0	1	0	0	0	0	2	0
Louisiana	14	2	5	0	0	2	0	0	1	0	0	0
Oklahoma	22	13	23	0	0	0	0	0	0	0	0	0
Texas	548	100	297	1	17	193	0	0	0	0	0	15
MOUNTAIN												
Montana	22	32	30	0	0	0	0	0	0	1	3	0
Idaho	3	3	6	0	0	0	0	0	0	0	0	0
Wyoming	1	4	3	0	0	0	0	0	0	3	2	0
Colorado	17	19	28	0	0	0	0	0	0	0	1	0
New Mexico	10	22	40	0	0	0	0	0	0	0	0	0
Arizona	23	18	35	0	0	0	30	0	0	0	0	0
Utah [2]	66	34	52	0	1	0	1	0	0	0	3	0
Nevada	0	5		0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	57	37	83	0	0	0	0	0	0	0	0	0
Oregon	28	14	20	0	0	0	0	0	0	0	3	0
California	378	333	356	0	4	8	0	0	0	0	0	0
Total	4,081	3,752	3,806	2	29	231	55	11	1	5	20	48
21 weeks	85,198	80,538	83,808	28	626	4,342	1,042	230	10	70	364	967
21 weeks, 1942				33	870	1,621	938	175	24	101	395	748

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Exclusive of delayed report of 4 cases in Virginia.

WEEKLY REPORTS FROM CITIES

City reports for week ended May 15, 1943

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	15	0	2	0	0	0	0	15
New Hampshire:												
Concord	0	0	------	1	1	0	3	0	2	0	0	0
Vermont.												
Barre	0	0	------	0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	1	0	------	0	258	13	18	1	208	0	0	40
Fall River	0	0	------	0	145	0	0	0	4	0	0	6
Springfield	0	0	------	0	12	0	1	0	46	0	0	1
Worcester	0	0	------	0	145	0	2	0	13	0	0	6
Rhode Island:												
Providence	0	0	1	0	17	7	0	0	20	0	0	14
Connecticut:												
Bridgeport	0	0	1	1	0	[illegible]	3	0	1	0	0	1
Hartford	0	0	------	0	56	0	2	0	4	0	0	1
New Haven	0	0	1	0	11	1	1	0	1	0	0	10
MIDDLE ATLANTIC												
New York.												
Buffalo	0	1	------	0	66	1	8	0	13	0	0	3
New York	14	1	10	1	1,233	49	84	0	424	0	5	74
Rochester	0	1	------	0	174	7	7	0	8	0	1	11
Syracuse	0	0	------	0	91	2	2	0	2	0	0	16
New Jersey:												
Camden	1	0	------	0	11	1	0	0	3	0	0	1
Newark	0		------	2	298	10	7	0	15	0	0	21
Trenton	0		------	0	21	0	6	0	4	0	0	0
Pennsylvania:												
Philadelphia	1	0	3	2	194	14	26	0	139	0	0	61
Pittsburgh	0	0	3	2	43	3	16	0	14	0	0	60
Reading	0	0	------	0	64	0	1	0	3	0	0	5
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	------	0	64	2	3	0	28	0	0	3
Cleveland	3	0	5	2	32	4	14	0	52	1	0	36
Columbus	1	0	------	0	56	0	2	0	14	0	0	4
Indiana:												
Fort Wayne	1	0	------	0	14	1	2	0	0	0	0	0
Indianapolis	4	0	------	2	197	1	5	0	24	0	0	24
South Bend	0	0	------	0	3	0	0	0	0	0	0	0
Terre Haute	0	0	------	0	15	0	1	0	1	0	0	0
Illinois:												
Chicago	13	0	4	2	715	15	30	0	94	0	0	66
Michigan:												
Detroit	2	0	------	0	1,390	11	21	0	41	0	1	89
Flint	0	0	------	0	233	0	0	0	2	0	0	5
Grand Rapids	1	0	------	2	38	0	2	0	3	0	0	17
Wisconsin:												
Kenosha	0	0	------	0	3	0	0	0	8	0	0	4
Milwaukee	0	0	------	0	668	0	8	1	181	0	0	65
Racine	0	0	------	0	5	0	0	0	22	0	0	1
Superior	0	0	------	0	14	0	0	0	1	0	0	0

City reports for week ended May 15, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0		0	15	0	1	0	1	0	0	[illegible]
Minneapolis	0	0		0	252	1	5	0	22	0	0	[illegible]
St. Paul	0	0		1	20	1	7	0	5	0	0	[illegible]
Missouri:												
Kansas City	0	0		0	75	0	1	0	47	0	0	[illegible]
St. Joseph	0	0		0	17	0	0	0	1	0	0	[illegible]
St. Louis	0	0	2	1	62	14	16	0	11	0	0	[illegible]
North Dakota.												
Fargo	0	0		0	5	0	1	0	1	0	0	[illegible]
Nebraska:												
Omaha	0	0		0	5	0	1	0	5	0	0	[illegible]
Kansas												
Topeka	0	0		0	107	0	0	0	1	0	0	[illegible]
Wichita	0	0		0	2	2	4	0	3	0	0	[illegible]
SOUTH ATLANTIC												
Delaware.												
Wilmington	0	0		0	10	2	3	0	1	0	0	
Maryland:												
Baltimore	1	0	6	1	162	7	21	0	74	0	0	[illegible]
Cumberland	0	0		0	0	0	1	0	1	0	0	[illegible]
Frederick	0	0		0	5	0	0	0	0	0	0	[illegible]
Dist. of Col.:												
Washington	0	0		1	123	2	5	0	18	0	0	[illegible]
Virginia.												
Lynchburg	0	0		0	5	0	0	0	0	0	0	[illegible]
Richmond	0	0		1	10	3	4	0	3	0	0	[illegible]
Roanoke	0	0		0	0	0	0	0	0	0	0	[illegible]
West Virginia:												
Wheeling	0	0		0	0	0	2	0	1	0	0	[illegible]
North Carolina:												
Winston-Salem	0	0		0	13	0	3	0	0	0	0	[illegible]
South Carolina.												
Charleston	0	0	3	0	4	0	0	0	2	0	0	[illegible]
Georgia·												
Atlanta	0	0	8	0	6	0	3	0	6	0	2	[illegible]
Brunswick	0	0		0	2	0	0	0	0	0	0	[illegible]
Savannah	0	0	5	0	2	1	0	0	0	0	0	
Florida:												
Tampa	0	0		0	5	0	0	0	1	0	0	
EAST SOUTH CENTRAL												
Tennessee												
Memphis	0	0	2	0	113	1	5	0	5	0	0	[illegible]
Nashville	0	0		0	10	0	2	0	0	0	0	
Alabama:												
Birmingham	0	0	3	1	15	2	6	0	0	0	0	[illegible]
Mobile	0	0	1	0	4	0	1	0	0	0	1	[illegible]
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0		0	5	0	4	0	0	0	0	[illegible]
Louisiana:												
New Orleans	2	0		0	14	1	8	0	0	0	1	[illegible]
Shreveport	0	0		0	0	0	4	0	0	0	0	[illegible]
Texas:												
Dallas	2	0		0	2	1	5	0	1	0	0	[illegible]
Galveston	0	0		0	0	0	0	0	1	0	0	[illegible]
Houston	0	0		0	0	0	3	0	0	0	0	[illegible]
San Antonio	1	0	2	2	2	0	4	0	1	0	0	[illegible]

City reports for week ended May 15, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
MOUNTAIN												
Montana:												
Billings	0	0	------	0	2	0	0	0	0	0	0	2
Great Falls	1	0	------	0	30	0	2	0	2	0	0	2
Helena	0	0	------	0	29	0	1	0	0	0	0	6
Missoula	0	0	------	0	18	0	0	0	0	0	0	0
Idaho:												
Boise	0	0	------	0	2	0	0	0	0	0	0	0
Colorado:												
Denver	2	0	9	0	206	2	7	0	8	0	0	12
Pueblo	0	0	------	0	7	1	0	0	2	0	0	5
Utah.												
Salt Lake City	0	0	------	0	65	1	3	0	8	0	0	43
PACIFIC												
Washington:												
Seattle	0	0	------	1	167	0	5	0	2	0	0	13
Spokane	1	0	1	1	33	0	0	0	2	0	0	7
Tacoma	0	0	------	0	2	0	0	0	3	0	0	0
California:												
Los Angeles	3	0	8	0	181	0	3	1	20	0	0	50
Sacramento	0	0	--	0	5	2	2	0	5	0	0	15
San Francisco	0	0	3	1	87	1	19	1	25	0	0	41
Total	55	3	81	28	8,208	191	440	4	1,693	1	11	1,187
Corresponding week-1942	62	4	63	25	5,980	46	310	3	1,150	0	17	1,278
Average, 1938–42	77	------	90	[1] 20	[2] 5,931	------	[1] 341	-----	1,496	10	22	1,240

[1] 3-year average, 1940–42.
[2] 5-year median.

Dysentery, amebic.—Cases: Boston, 1; New York, 9; Washington, 1; Los Angeles, 1.
Dysentery, bacillary.—Cases: Buffalo, 4, New York, 4; Philadelphia, 1; Detroit, 1; St. Louis, 6; Charleston, S. C., 6; Los Angeles, 7.
Dysentery, unspecified.—Cases: San Antonio, 17.
Leprosy.—Cases: Philadelphia, 1
Rocky Mountain spotted fever.—Cases: Boise, 3
Typhus fever.—Cases: Mobile, 2; Galveston, 1, Houston, 2.

Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1942, 34,540,300)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	2.5	0.0	7.5	5.0	1640	62.1	79 5	2.5	743	0.0	0 0	234
Middle Atlantic	7.1	1.3	7.1	3.1	979	38.8	70 5	0 0	279	0 0	2.7	112
East North Central	14.7	0.0	5.3	4.7	2030	20.0	51.8	0 6	277	0.6	0.6	185
West North Central	0.0	0.0	3.9	3.9	1094	35 2	70 4	0 0	190	0 0	0 0	254
South Atlantic	1.8	0.0	39.0	5.3	616	26.6	74.5	0.0	190	0 0	3.5	280
East South Central	0.0	0.0	35.6	5.9	843	17.8	83 2	0 0	30	0.0	5.9	107
West South Central	14.7	0.0	5.9	5.9	67	5.9	82.1	0 0	9	0.0	2.9	56
Mountain	24.1	0.0	72.4	0.0	2886	32.2	104.5	0.0	161	0.0	0.0	563
Pacific	7.0	0.0	21.0	5.2	830	5 2	50 7	3.5	115	0.0	0 0	231
Total	8.3	0.5	12.2	4.2	1239	28.8	66 4	0.6	256	0.2	1.7	179

PLAGUE INFECTION IN CALIFORNIA, NEW MEXICO, AND WASHINGTON

Plague infection has been reported proved on May 17 in a pool of 45 fleas from 4 ground squirrels, *C. beecheyi*, taken on a ranch 4 miles east of Crows Landing, Stanislaus County, Calif.; in a pool of 15 fleas from 9 prairie dogs, *Cynomys ludoviciamus arizonensis*, taken on April 22 from a location 1½ miles south of Corona, Lincoln County, N. Mex.; and in tissue from 1 rat taken on May 4 from a frame building in an industrial and commercial district of Tacoma, Pierce County, Wash.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended May 1, 1943.—During the week ended May 1, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	1	18	1	185	187	14	33	26	40	500
Diphtheria		16		19	2	6			1	44
Dysentery (bacillary)				23						23
German measles		4		22	110	2	1	25	7	171
Influenza		3	4		211	1	3		34	256
Measles		110	8	424	1,840	84	211	239	484	3,395
Meningitis, meningococcus		1		8	4			1		14
Mumps	2	70	7	70	904	66	76	62	104	1,361
Scarlet fever		46	39	42	421	26	36	43	29	682
Tuberculosis (all forms)	1	3	5	167	44	14		3	58	295
Typhoid and paratyphoid fever			1	28		2				31
Undulant fever				1						1
Whooping cough			1	75	134	39	22	29	39	339

CUBA

Habana—Communicable diseases—4 weeks ended May 1, 1943.—During the 4 weeks ended May 1, 1943, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	28		Scarlet fever	2	
Leprosy	1		Tuberculosis	14	4
Malaria	10		Typhoid fever	30	6
Measles	21				

Provinces—Notifiable diseases—4 weeks ended April 24, 1943.—During the 4 weeks ended April 24, 1943, cases of certain notifiable diseases were reported in the Provinces of Cuba, as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	1	1	5	15		11	33
Chickenpox	1		1	1	8	20	31
Diphtheria	1	31	4	1		2	39
Hookworm disease				1			1
Leprosy		1				1	2
Malaria	38	2		2		101	143
Measles		10		1		1	12
Poliomyelitis				1		4	5
Rabies		1					1
Tuberculosis	23	17	23	32	17	64	176
Typhoid fever	9	48	8	27	19	14	125
Whooping cough				1			1

[1] Includes the city of Habana.

IRAQ

Cerebrospinal meningitis.—The following table shows the numbers of cases of cerebrospinal meningitis and deaths from the same cause in Basra Liwa, Iraq, for the period January 24 to April 17, 1943:

Week ended—	Cases	Deaths	Week ended—	Cases	Deaths
Jan. 30, 1943	10	0	Mar. 20, 1943	9	5
Feb. 6, 1943	4	2	Mar. 27, 1943	13	3
Feb. 13, 1943	2	0	Apr. 3, 1943	7	2
Feb 20, 1943	9	1	Apr. 10, 1943	4	1
Feb 27, 1943	7	3	Apr. 17, 1943	5	1
Mar. 6, 1943	9	3			
Mar 13, 1943	10	1	Total	89	22

JAMAICA

Notifiable diseases—4 weeks ended May 8, 1943.—During the 4 weeks ended May 8, 1943, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	10	37	Puerperal sepsis		2
Diphtheria	4	1	Tuberculosis	42	62
Dysentery	1	2	Typhoid fever	4	31
Leprosy		5	Typhus fever	2	1

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Morocco—Casablanca region.—During the month of March 1943, 24 cases of plague were reported in the region of Casablanca, Morocco.

Smallpox

Algeria.—For the period April 11–20, 1943, 35 cases of smallpox were reported in Algeria, including 2 cases in Algiers and 12 cases in Cheliff.

Belgium.—For the week ended April 17, 1943, 1 case of smallpox was reported in the Province of Namur, Belgium.

Iran.—For the period December 6, 1942, to January 29, 1943, 203 cases of smallpox were reported in Iran.

Morocco.—For the month of March 1943, 253 cases of smallpox were reported in Morocco, including 1 case in Casablanca, 6 cases in Port Lyautey, 5 cases in Safi, and 1 case in Rabat.

Typhus Fever

Algeria.—For the period April 11–20, 1943, 464 cases of typhus fever were reported in Algeria, including 27 cases in Algiers, 38 cases in Bone, 13 cases in Philippeville, 56 cases in Oran, and 10 cases in Mostaganem.

Hungary.—During the week ended May 8, 1943, 34 cases of typhus fever were reported in Hungary.

Iraq.—For the month of April 1943, typhus fever (endemic and epidemic) was reported in Iraq as follows: Amara, 58 cases, 5 deaths; Baghdad, 71 cases; Basra, 111 cases, 29 deaths; Diwaniyah, 20 cases, 2 deaths; Diyala, 16 cases, 3 deaths; Dulaim, 3 cases; Erbil, 6 cases; Hilla, 6 cases; Kirkuk, 30 cases; Mosul, 109 cases, 11 deaths; Sulaimaniya, 57 cases, 1 death.

Mexico—Mexico, D. F.—Typhus fever has been reported in Mexico, D. F., Mexico, as follows: Weeks ended—March 6, 32 cases, 5 deaths; March 13, 25 cases, 3 deaths; March 20, 37 cases, 10 deaths.

Morocco.—For the month of March 1943, 3,759 cases of typhus fever were reported in Morocco, including 12 cases in Casablanca, 80 cases in Sale, 12 cases in Port Lyautey, and 21 cases in Safi.

Rumania.—For the week ended May 8, 1943, 305 cases of typhus fever were reported in Rumania, including 19 cases in Bucharest.

Slovakia.—For the week ended May 1, 1943, 6 cases of typhus fever were reported in Slovakia.

Spain.—For the week ended April 3, 1943, 9 cases of typhus fever were reported in Spain.

×

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 58 JUNE 11, 1943 NUMBER 24

IN THIS ISSUE

CONTENTS

Public Health Reports

Vol. 58 • JUNE 11, 1943 • *No. 24*

A BLUEPRINT FOR THE CONQUEST OF HUNGER

By THOMAS PARRAN, M. D.,* *Surgeon General, United States Public Health Service*

The United Nations Conference on Food and Agriculture reached conclusions that carry far-reaching implications for the future health of mankind. Meeting at Hot Springs, Va., May 18 to June 3, 1943, in response to an invitation from President Roosevelt, representatives of 44 nations considered the world problems of food and agriculture and declared their belief that freedom from want of food can be achieved for all the peoples.

The Conference was held against the somber background of the greatest of all wars. The suffering and heroism of the fighting forces and the millions held in enemy bondage seemed to spur every delegate to plan boldly for the future, confident of ultimate victory and convinced that the peace no less than the war must be won. Once freedom from fear has been attained through victory, the efforts of nations, both individual and collective, must be no less determined, no less concerted, to attain for all peoples freedom from want. And food is the first want of man. There was a general feeling that President Roosevelt showed rare intuition in making food and agriculture the topic of the first of the United Nations Conferences to plan for dealing with long-term problems after the war.

At the first plenary session, May 18, the Conference was organized into four sections dealing broadly with four main questions:

1. What are the needs of the peoples of the world for foods essential to health, and for other agricultural products?

2. What are the prospects for organizing world agricultural production so as to expand it and better direct it for supplying consumption needs?

3. By what means can the increased production be distributed to meet human requirements?

*Dr. Parran was one of the six delegates of the United States to the United Nations Conference on Food and Agriculture, Hot Springs, Va., May 18 to June 3, 1943.

4. What kind of continuing international organization is necessary to aid in accomplishing the above objectives?

This article deals primarily with the first topic—consumption levels and requirements—which was the cornerstone upon which other discussions of the Conference were built. In the deliberations of Section I, reports were received and conclusions reached concerning the relation of food to health, the nature and extent of food consumption and deficiencies in the various nations, the causes and consequences of malnutrition, the measures which can be taken to improve standards of consumption, and, finally, reasonable national and international nutritional goals.

From the outset, competent nutrition experts and health authorities from many countries were agreed that there never has been freedom from want of food among all the people in any land. In every country the consumption of food adequate for health is deficient. There are wide variations in nutritional status between nation and nation. However, even in the nations considered to be the best fed, widespread and serious malnutrition was reported. In those countries, regions, and population groups where consumption deficiencies are most marked, disease and death rates are the highest, life expectancy is shortest, and the mental and physical vigor of the people is the lowest.

It was clear that the one-time excessive accumulations of certain agricultural products were not surpluses at all when measured by the world's minimum needs of food and clothing. Rather these accumulations were the results of maldistribution and underconsumption. Indeed, the greatest possible increase in world production of those foods essential for health will not satisfy for many years the minimum nutritional requirements of the world's population.

Yet, at Hot Springs, for the first time in history, delegates representing 44 nations agreed unanimously that the conquest of hunger and progressive improvements of diets are attainable goals. At the close of the last war, such a conference and such conclusions would not have been possible. It is the growth of scientific knowledge in this century which will implement the realization of the high goals set by the Conference. The advance of science in three sectors has an important bearing on solving the problems of food and health.

First, the development of agricultural science has made it possible to grow two bushels of food where one grew before.

Second, mechanical science applied to production and transportation has lightened the labor of man, replaced domestic draft animals, and multiplied greatly the capacity to produce and distribute foods.

Third, the newer knowledge of nutrition and its relation to human health—one of the greatest scientific miracles of our time—has taught what is required to nourish the human body. Thus it is possible to

eradicate many diseases directly caused by a deficiency in diet, to reduce infant and maternal mortality, to prolong the active productive span of life, and to attain a higher level of physical and mental vigor.

Since the Conference was a technical and exploratory one, the delegates were not empowered to commit their governments to specific courses of action. They were authorized only to "recommend." With this limitation, the countries recommended in a formal declaration that the governments accept "the obligation to their respective peoples and to one another henceforth to collaborate in raising levels of nutrition and standards of living of their peoples, and to report one to another on the progress achieved." Further, the Conference recommended that a permanent international organization in the field of food and agriculture be established. For this purpose an interim commission was created to be convened in Washington promptly. This commission will have for its function the development of a specific plan for a permanent organization. The exact nature and scope of the permanent body will be determined later. Subjects to be considered by the interim commission will include nutrition, standards of food consumption, agricultural production, distribution and conservation statistics, and economic studies in the field of agriculture and food with respect to world economy, agriculture, agricultural education and extension work, agricultural credit and commodity arrangements, cooperative movements, land tenure, and so on.

In declaring its conviction that "the goal of freedom from want of food suitable and adequate for the health and strength of all peoples can be achieved," the Conference recognized that the first task is to win the war and then, through urgent and concerted efforts to prevent hunger and starvation by economies in consumption, increasing supplies and distributing them where most needed.

The Conference stated that there never has been enough food, a lack justified neither by ignorance nor by the harshness of nature. We have the knowledge by which to accomplish the necessary increased production of food. The attainment of this goal requires imagination and firm will on the part of each government and each people to make use of that knowledge.

Food and agriculture, however, cannot function entirely apart from other spheres of national and international life. Poverty must be alleviated by policies of full employment, a greater flow of trade within and between countries, by an expansion of world economy to provide the purchasing power for adequate diets.

The primary responsibility for appropriate action in these fields rests with each country itself, but the Conference held that "national

action alone is not enough. The efforts of each nation can be enhanced by international collaboration for the benefit of all."

Here then is a daring plan and the first draft of a blueprint for the conquest of hunger.

Among the objectives accepted by the Conference is the wiping out of widespread devastating diseases caused directly by lack of the proper food. The conviction that this can be accomplished flows naturally from the traditional policy in every civilized society to see that, insofar as possible, no one should be allowed to starve or to go hungry. But science has given us a new definition of starvation and hunger. No nation has ever been free of hunger in its modern sense. The pellagrous sharecropper dragging his feeble body along the cotton row, the coolie with swollen legs working in the rice paddie, the child with bones deformed by rickets—these are, in truth, hungry, starving people.

Moreover, many deaths and much disease not directly attributed to malnutrition result from the lack of enough food of the right kinds. In some of the worst fed countries, nearly 50 percent of the total mortality occurs among children under 10 years of age. This proportion is about five times greater than in the best fed countries. In the poor countries, too, tuberculosis deaths are seven or eight times higher than among the better fed populations.

Over and above the negative achievement of decreased disease and death is the goal of a higher standard for mankind, the goal of a race more fit, more vigorous, with greater physical and mental stamina than the world has ever known.

Since malnutrition with its attendant suffering is a close and constant companion of poverty, measures to alleviate poverty are of cardinal importance. But general economic advances, while contributing indirectly to the improvement of nutrition, do not in themselves insure that everyone will have an adequate diet. Their benefits are spread unevenly among the population. Therefore, each government must seek to improve the diet of its own people by providing for those whose need is greatest in proportion to their physiological needs, however scarce or plentiful the supplies of food may be.

The report from Great Britain gave a striking example demonstrating how effective such a food and nutrition policy, based on scientific knowledge and experience, can be in safeguarding the health of a population. For example, in Great Britain "food imports have been greatly restricted in the war, and the Government found it necessary to assume control of food importation, production and trade, and to institute strict rationing. The distribution of food was planned with the assistance of nutrition experts so as to assure to each section of the community an equitable share of the food needed for the maintenance of health. The needs of children, mothers, and heavy workers were

given special consideration. The result has been that, in spite of a deterioration in housing and other social conditions, the health of the nation has been maintained at a high level, and in 1942 the infant mortality was the lowest on record and the general death rate showed a fall."

The technical reports of the Conference made clear that there are certain "vulnerable groups" in a population whose physiological needs are relatively greater, and for whom the national policy should provide extra measures and, if necessary, direct action to insure an adequate food supply. These groups include the pregnant women, infants, school children (especially the adolescents), workers in heavy industries, and the poor, particularly those with large families. In this connection, the Conference stated that "direct acceptance of responsibility by public authorities for bringing the needed foods free or at a low cost to the vulnerable groups is the most practical way of improving their nutrition. It also increases the total demand for food and the income of producers, with resulting better health and capacity to produce. Such measures should therefore form a part of a national policy in every country."

Reports were presented from every continent describing the problems of malnutrition In India, China, and Java very similar nutritional problems were encountered. A large proportion of the population does not get *enough* to eat. Diets consist largely of cereals, with inadequate amounts of meat, milk, eggs, fish, vegetables, and fruits. Beri-beri is prevalent, killing infants and paralyzing adults. Osteomalacia is also widespread, softening the bones and leading to an extreme degree of painful crippling. Among these nations, the expectation of life at birth is low, the mortality among infants, children, and women in the child-bearing period is high, and resistance to diseases of many kinds is feeble. "Numerous lines of evidence converge to show that malnutrition is the chief cause of this rapid and tragic exit of young human beings from the world so soon after their arrival in it," reported the delegate from India.

In tropical Africa and some colonial and other tropical areas of the world, there was abundant evidence of malnutrition and deficiency diseases. Typically, their peoples depend upon a single crop. There is little or no milk and the supply of proteins, fats, calcium, and vitamins is low. Malnutrition and widespread tropical diseases interact upon each other; each aggravates the other, thus creating a vicious circle.

In short, taking the world as a whole, "the picture is one of world-wide underconsumption, leading to malnutrition and its attendant evils. One of the tasks of the proposed United Nations Food and Agriculture Organization will be to complete the picture in dismal detail and to replace it by a brighter one."

These reports did not refer primarily to the situation created by the war, which has reduced the world's food supply, affected consumption in almost every country, and brought scarcity and famine to countries occupied by the enemy. And although the Conference was not directly concerned with the existing situation and postwar relief, it was abundantly demonstrated that the acute and immediate problem and the long-range problem are parallel in many respects, each calling urgently for concerted action.

There were dramatic moments at the Conference. Each of the major nations put forward a statement of national policy in reference to the objectives of the Conference. With unanimity of purpose, then, the Conference was able to report: "Nutrition, therefore, becomes a primary concern of governments everywhere. To give conscious planned direction to mankind's need for food in the modern sense, each nation should develop a national food and nutrition policy, to the full fruition of which related social and economic policies will need to be adapted."

The United States delegation advanced a general proposition for a continuing organization to carry forward the work of the Conference. China and Great Britain indicated their acceptance in principle. The Russian delegation called Moscow for instructions. After two days, the chairman of the Russian delegation arose and gave the answer—in Russian. What was he saying! Then came the interpretation. The answer was, "Yes." Russia, already carrying the heaviest fighting load and contributing the greatest amount of blood to the common victory, would very gladly join other free nations in an international organization of free peoples to attain freedom from the want of food.

The report of Section I outlined many specific tasks as goals for the future. For example, the training of professional personnel for nutritional and educational services presents a formidable task. Likewise, much can be done to improve the quality of available foods in preparation, processing, and storing. Basic sanitary measures are necessary to prevent contamination, particularly in the production and handling of milk and green vegetables consumed frequently in the raw state. The conservation of vital elements—minerals and vitamins—during processing will do much to improve available foods, as does also the enrichment of white flour and bread, the addition of iodine to salt, or of vitamins A and D to margarine.

The great value of synthetic vitamins in the medical treatment and prophylaxis for deficiency diseases, under special circumstances, was recognized. However, the indiscriminate distribution of synthetic vitamins was not recommended as a public health procedure. Many countries reported that consumers are misled as to the content of foods, vitamin products, food extracts, and other food preparations.

Regulations were recommended for adoption to provide for correct labeling and otherwise to insure the standards and quality of foods.

The Conference emphasized that the habits and tastes of a people must be taken into consideration in planning nutrition policies. The aim of those responsible for securing improvements in national nutrition should be to frame their policies in tune with the social traditions. Traditional dietary practices are supported by the whole cultural complex of attitudes toward social class, religion, the rhythms of work and rest periods, the education of children, and the formalized social ties between persons and groups. Many of these attitudes are often imperfectly understood and the imposition of a practice foreign to a community may indeed have very unfortunate results upon agricultural production, and, in turn, on the supply of food. This is particularly true of measures which result in the breakdown of unity and collaboration within a social unit. This important factor emphasizes the influence of education, not only of individuals but also of professional, governmental, and other groups of the community who are in a position to affect nutritional and related policies.

Of greatest significance to the public health profession was the responsibility placed by the Conference upon medical and health authorities in the attainment of the world-wide goals there defined. Nutrition is linked on the one hand with public health, on the other with agriculture. At all stages, from the recognition of the existence of malnutrition in a community to its elimination, knowledge of the behavior of the human body is essential. Because they possess and can contribute this knowledge, medical and health administrators have a primary responsibility in nutritional fields. Any advance in health through better nutrition will demand the full collaboration of public health and agricultural authorities. The former will play an important role both in determining needs and in guiding the available forces toward the practical attainment of freedom from hunger for the peoples of the world.

DERMATITIS FROM RESIN GLUE IN WAR INDUSTRIES [1,2]

By Louis Schwartz, *Medical Director*, Samuel M. Peck, *Senior Surgeon*, and John E. Dunn, *Surgeon, United States Public Health Service*

The use of plywood in the manufacture of planes, gliders, propellers, and other airplane accessories has increased enormously. With the requisitioning of more and more wood for the manufacture of airplane parts, the shortage in other industries has necessitated the manufacture of substitutes such as laminated asbestos, laminated glass

[1] From the Division of Industrial Hygiene, National Institute of Health.

[2] This report is based on studies in seven war plants using glue for laminating wood and fabrics.

fabrics, laminated paper, etc. An increased use of glues is entailed in the manufacture and use of wood substitutes, and, coinciding with this, an increase in occupational dermatitis among workers in these industries has been observed.

Dermatitis from glues has often been reported in the past (*1*), but there has been no such outbreak as that which is now occurring in the plywood and laminating industries. In one factory laminating plywood for planes and gliders (where about 800 workers are employed) 600 cases of glue dermatitis occurred in the first six months of operation. These workers lost about 1,500 work days, not counting the time lost by those who stayed on the job while receiving treatment in the factory first aid station. In a factory making tool handles from laminated glass fabric and phenol-formaldehyde molding resin, there was a monthly labor turnover, because of dermatitis, of over 40 for the first six months of operation among a total of 100 employees.

Twelve workers in a factory where paper is coated with a phenol-formaldehyde glue for use in making plywood were affected with dermatitis, and in another, where an alkaline casein glue was used for small wooden airplane parts, the fingers of most of the workers were inflamed and fissured by the glue.

COMPOSITION OF GLUES

Glue compositions vary widely. They can be roughly classified as (1) protein glues, (2) natural resin glues, (3) synthetic resin glues, (4) combinations of the foregoing.

Catalysts may be used in glues containing the synthetic resins.

The protein glues can be made from gelatin, hides, bone, cartilage, casein, isinglass (air bladder of the fish), fish heads (cod, haddock, hake), and vegetable protein (soya bean).

The natural resin glues may be made from dextrin, gum arabic, acacia, shellac, copal, dammar, rosin, etc. To any of these may be added such chemicals as sodium silicate, sodium hydroxide, sodium fluoride, zinc chloride, and copper salts. It is evident that a glue, the name of which may lead one to think that it is quite harmless (gelatin glue, casein glue), may actually contain powerful primary skin irritants.

Synthetic resin glues caused the majority of cases of dermatitis observed in this study. The following synthetic resins, either alone or in combination with each other or with natural resins, may be used as liquid cold glues, thermal setting glues, or molding powder glues: Cumarone, polyvinyl esters, ethyl esters, methyl esters, cellulose esters, cellulose nitrate, alkyd, dicyanodiamide, urea-formaldehyde, phenolformaldehyde.

In the manufacture of these synthetic glues, catalysts are often added. For this purpose mineral acids (HCl or H_2O_4S), alkalis

(NaOH, KOH, CaO, NH_4OH, etc.), zinc oxide, potassium cyanide, hydrazines, amine hydrochloride, sodium ethyl sulfate, alkyd resins, and dicyanodiamide resins are employed. The completely polymerized or cured resins rarely cause dermatitis, but completely polymerized resins can seldom be used as glues. The incompletely polymerized or partially cured resins are the ones most used as adhesives and these contain the incompletely combined irritant chemicals which can and do cause dermatitis. The addition of the catalysts, many of which are themselves primary irritants, increases the skin irritant properties of resin glues.

The urea-formaldehyde and the phenol-formaldehyde resin adhesives are the ones found to cause most of the dermatitis in the factories inspected in the course of this study.

The urea-formaldehyde resins may contain thiourea or may be modified with furfural, acrolein, alkyd, ketone, phenol resins, etc.

The phenol-formaldehyde resins may contain cresol, naphthol, catechol, resorcinol, xylenol (tar acid), and salicylic acid combinations with formaldehyde or with butaryl, benz-, acet-, and paraldehydes. These combinations may also be chlorinated. They may be modified with any of the other resins mentioned above.

To determine the irritating chemical radical causing the dermatitis, the actual composition of the resin and the stage of polymerization should be known before patch tests can be performed intelligently. This information must be obtained from the manufacturers, as chemical analysis often fails in this respect.

In previous studies on resin molding powders (*2*) it was found that formaldehyde was the chief irritant in these powders, being responsible for about four-fifths of the cases. The phenol fraction was responsible for the remainder. Hexamethylene tetramine, which is present in many of the molding powders to supply the additional formaldehyde needed to complete the cure in the mold, is not present in the glues. But since formaldehyde is present in the urea and phenol-formaldehyde glues, the absence of hexamethylene tetramine does not deprive them of their skin irritative properties. The presence of phenols and formaldehyde in the glues can often be detected by the odor.

The resin glues are used in the manufacture of plywood, fiberboard, laminated asbestos, glass cloth, tool handles and partitions, for coating paper and fabric to be used for adhesives, and for many other purposes.

They are used in powder form, paste form, in solution, and as cold glues, or thermal setting glues (with the addition of pressure).

That these glues are primary skin irritants if they come in contact with the skin in sufficient concentration has been proved by 24-hour patch tests on several controls.[3] That these glues are also sensitizers

[3] Controls often show delayed reactions appearing 24 to 72 hours after removal of the patch.

is proved by the fact that the workers having dermatitis react more rapidly to patch tests than do the controls, as well as by the fact that about 50 percent of the affected workers, if they are permitted to work while undergoing treatment, develop a tolerance to limited contact with the glues containing comparatively weak concentrations of the irritant chemicals.

In making plywood for planes and gliders, those who apply the cold liquid glues to the edges of the sheets of wood and those who apply the glue tapes (Tego) to the surface of the panels to cover defects are the ones most likely to be affected with dermatitis. The parts most often affected are the palms (fig. 1) where they contact glue-soiled brush handles and spatulas, the dorsum of the hands, from glue-soiled washing solutions and glue-soaked sponges, and the forearms (fig. 2) which are touched with glue-soiled fingers and tools. Those who work without stockings while shaping the panels in the molds often develop dermatitis on the legs (fig. 3) where the glue touches the skin.

In some cases dermatitis begins as early as the third day after exposure (the primary irritant effect of the glue) while others may be exposed several weeks before dermatitis occurs. No doubt the degree of exposure to the glues and the personal cleanliness of the worker are the main factors determining the time of onset of dermatitis.

Those working on the presses, which heat and press together the sheets causing them to adhere and form plywood, are only occasionally affected. These workers are subjected mainly to the fumes of formaldehyde coming off the presses and only occasionally to contact with the uncured glue.

In factories where plywood propellers and other rigid parts are made, the contact is somewhat different. Here the pieces of veneer are impregnated with liquid resin glue by dipping them into a vat and then placing them in a pressure chamber. The workers at this operation are exposed to strong fumes of formaldehyde and to splashes of liquid. Unless properly protected these men will develop dermatitis, conjunctivitis, and irritation of the respiratory tract. Those engaged in mixing the glues are similarly exposed. Workers who machine, sandpaper, and polish plywood are exposed to wood and resin dusts. Some of the plywood is machined before the resin glue is completely cured and at such operations there is more dermatitis than at operations where the completely cured resin dust is encountered.

In factories where glass cloth is made into tool handles and translucent partitions, workers thought the glass fabric was the cause of the dermatitis, but patch tests showed that the condition was caused by phenol-formaldehyde molding powder which is spread on the fabric before it is placed in the hot pressure molds. The operation of placing the molding resin powder on the cloth should be performed in such

FIGURE 1.—Dermatitis of palm from glue-soiled brush handles and spatulas.

FIGURE 2.—Dermatitis of forearms touched with glue-soiled fingers and tools.

FIGURE 3.—Dermatitis of leg where glue has touched uncovered skin

manner that the resin powder does not come in contact with the worker.

An occasional case of dermatitis occurs because of the workers' sensitivity to the woods. The following woods were used in the factories inspected: Ash, basswood, birch, cedar, elm, gum, magnolia, mahogany, maple, oak, poplar, red gum, satinwood, and spruce. While dermatitis caused by sensitivity to cedar, poplar, satinwood, spruce, and mahogany has been reported, all the cases of wood sensitivity seen in this study were said to be caused by mahogany coming from Central and South America. (Because the mahogany causes dermatitis, some workers call it "tobasco mahogany.")

The trade names of the resin glues encountered in this study were: Urea-formaldehyde type, Uformite powder, Uformite liquid, Plaskon, phenol-formaldehyde type, Durez, Bakelite, Amberlite, Tego.

The catalysts used were ammonium chloride, ammonium sulfate, oxalic acid ester, hypophosphorous acid ester, and benzoyl peroxide.

The principles of treatment of dermatitis caused by the glues are the same as for any other form of contact dermatitis. In the acute stages where there is edema, vesicles, and oozing, only soothing wet dressings should be used, such as boric acid solution, Burow's solution, and tannic acid solution 3 to 5 percent, this last on parts other than the face or neck. In the later stages, when the eruption begins to dry and crust, the use of mild fatty-base ointments such as boric acid ointment, calamine ointment, or zinc oxide ointment should be used. The use of phenols for antipruritic purposes should be avoided, because they may increase the dermatitis. If complications, such as infection, set in, special treatment may be required. Workers with mild cases should be given protective clothing, and should be treated on the job in order to give them the chance to become "hardened" (if the dermatitis is caused by allergy) and to learn how to protect themselves (if it is due to primary irritation).

To prevent dermatitis among workers with resin glues, the management should first of all provide suitable exhausts to draw away from the workers all irritant dusts or fumes coming off the operations. The management should provide, daily, clean coveralls for all workers exposed to irritant glues, dusts, and fumes.

Workers who apply the glues to the veneer should be provided with impervious gloves, made either of washable leather or fabric-lined rubber, and sleeves and aprons of impervious materials (*3*). The sleeves should fasten over the gloves at the wrist to prevent irritants from falling into the gloves.

Facilities for washing the hands with soap and running water should be installed at strategic places so that the workers can frequently wash glue from the gloves and skin. The brushes and sponges used for glueing should be washed or changed about every 2 hours and workers

should be cautioned against touching the face and other parts of the body with glue-soiled fingers, gloves, or tools.

Sufficient shower baths should be provided for workers, and they should be compelled to take showers after work. Sufficient time should be allowed for this and the workers should be paid for the time.

Protective ointments or applications are not necessary if these precautions are observed, but if they are used they should be furnished by the management and should be used in addition to all of the other preventive measures. The type of applications best suited to prevent glues from touching the skin are either those of the water insoluble invisible glove type, or of the water repellant fatty type described (as type 2B and type 3, respectively) in an earlier article (*4*).

REFERENCES

(*1*) Schwartz, Louis, and Tulipan, Louis: A Text-book of Occupational Diseases of the Skin, pp. 611–613. Lea & Febiger, Philadelphia, 1939.
(*2*) Schwartz, Louis: Skin Hazards in American Industry, Part II. Pub. Health Bull. No. 229, pp. 1–6. Government Printing Office, 1936.
(*3*) Schwartz, Louis, Warren, Leon H., and Goldman, Frederick H.: Clothing for protection against occupational skin irritants. Pub. Health Rep., 55:1158 (June 28, 1940).
(*4*) Schwartz, Louis: Protective ointments and industrial cleansers. Med. Clin. No. Am., 26: 1195–1212 (July 1942).

ACTIVITIES OF STATE AND LOCAL INDUSTRIAL HYGIENE SERVICES IN A WAR YEAR [1]

By Victoria M. Trasko, *Assistant Statistician, United States Public Health Service*

In a plant formerly making stoves and now producing metal boats, several workers on an operation involving the use of lead are showing symptoms of lead poisoning. In a large aircraft plant, spray painting inside the fuselage and gas tanks of large aircraft is offering a ventilation problem. A textile plant, now making bomb parts, is suddenly experiencing an alarmingly high accident rate. In a shipyard, keratoconjunctivitis is assuming epidemic proportions not only among welders and burners, but also among other workers. A radium dial painting plant is about to begin operation and the effectiveness of its newly installed control measures needs checking.

These, in brief, are examples of typical health problems on the war production front today. Assisting industry to solve such problems and a multiplicity of others is a major function of the State and local industrial hygiene services in the country. The responsibility for extending similar services to the war industries as expeditiously as possible was delegated to them as their role in the present Nationwide industrial hygiene program.

[1] From the Division of Industrial Hygiene, National Institute of Health.

The contribution of the industrial hygiene services to the war effort, insofar as it can be evaluated statistically, is perhaps not as dramatic as the story of industry's output of war material in 1942. It is, however, real and, as will be shown, commensurate with their resources for doing such work and a definite aid to the war production effort.

SCOPE OF INDUSTRIAL HYGIENE SERVICES

The organization of industrial hygiene services in the country has never been so extensively developed as today, although limitations in personnel and facilities control the extent of their activities. In January 1943, industrial hygiene services were established in 38 States, 6 cities, and 2 counties, making a total of 46 units altogether. These units are located in the State and local health departments with the exception of one State unit which functions in the State labor department, and another which functions jointly with the State health and State labor departments. Six of the units were established since the entry of the United States into the war, 9 units during the defense preparation years 1940 and 1941, 24 units from 1936 to 1939, and the remaining 7 units prior to 1936.

As a rule the professional personnel of an industrial hygiene unit function as a team, each person having certain services to perform. A typical unit consists of a physician, an engineer, a chemist, frequently a nurse, and the usual supporting staff of one or more clerks. However, only 14 of the 38 State organizations have staffs consisting of more than 4 professional employees. Altogether there are 300 personnel, both professional and clerical, in these States. It can be observed that the organization that is working towards the reduction of some of the 500 million man days lost annually in industry from disability is not numerically an impressive one.

As compared with the economic cost of these disabilities, which amount to at least 10 billion dollars annually, the amount that the industrial hygiene services spend for preventive work is likewise not startling. The units are allotted for the 1943 fiscal year, a year of major war production, $1,006,000 for this work. This is only $75,000 more than was spent in the 1942 fiscal year.

Without Federal assistance many of the units would be unable to meet the additional demands placed upon them by the war effort. As it is, a cooperative relationship exists between the State and local industrial hygiene services and the Division of Industrial Hygiene, National Institute of Health. Early in 1941 this Division was designated by the Subcommittee on Industrial Health and Medicine of the Office of Defense Health and Welfare Services to assume the leadership for activities in connection with the Nation-wide industrial hygiene program, and not only guides the units in their work but

gives them practical assistance. It is through this Division that the units maintain contact with the war agencies such as the War Manpower Commission, War Production Board, and Office of Civilian Defense, and help to carry out locally the policies formulated nationally.

The practical assistance the units receive from this Division is of various types. As of January 1943, 57 professional personnel were assisting 27 States on a lend-lease basis from the Division of Industrial Hygiene. Much of the educational material such as workers' health pamphlets, radio scripts, and movies is prepared for their use and distribution. The units call upon the Division for consultation services in the fields of administration, industrial medicine, engineering, nursing, and dentistry. The units are loaned needed field and laboratory equipment and receive assistance with laboratory work involving expensive apparatus and detailed procedures. For instance, State units submitted approximately 700 samples for analysis to the Division's laboratories last year. They benefit from the results of research which the Division conducts on toxic materials such as benzol, toluol, synthetic rubber, and others. Through a monthly news letter, issued by the Division, and periodic gatherings, activities are publicized and ideas exchanged, making for further unity and closer relations.

Thus, the State and local industrial hygiene services, despite limited resources, are in an excellent position to help industry with its health problems and to advise on general services concerned with adult health. Moreover, the legal responsibility for industrial health maintenance lies with these organizations. The 38 States in which they function contain 95 percent of the country's labor force and include all the highly industrialized States. The typical war problems of industrial health are found in all their ramifications in these States.

FIELD ACTIVITIES

Unfortunately, it is not possible to show what all 46 units in the 38 States have accomplished during a uniform period of time. A voluntary system for reporting field activities was developed early in 1939 by a special committee of the National Conference of Governmental Industrial Hygienists (*1*). After some trial this system was revised and at present consists of a brief individual history of each plant investigation and certain information on promotional and educational activities. Such reports have been received from 35 units in 29 States covering their field activities for the fiscal period ended June 1942.

In general each unit engages to some degree in three types of activities: Promotional, educational, and technical. The objective of each unit is closely tied up with the war effort and is the same for all—the reduction of lost time in industry through the promotion and conservation of the health of the worker. Each unit's program, at present,

calls for a concerted effort to contact each industrial establishment working on Government contract, and to render to the plant certain services pertaining to the conservation of the worker's health. Because no one unit can possibly hope to cover all phases of industrial health, cooperative working relationships are established with the various official and nonofficial agencies in the State.

During the 1942 fiscal year, the 35 reporting units rendered some type of industrial hygiene service to 2,600,000 workers in 5,688 establishments. When we realize that about 12 million workers were directly engaged in war production by the middle of 1942, 2,600,000 workers by comparison is small. On the other hand, the organization undertaking this work is likewise small. In many instances the plants were converting and had not yet employed their full complement of workers at the time of the plant investigation. Moreover, we have no way of telling how many more workers were indirectly benefited nor the extent of saving in terms of lives, prevented illnesses, and days for production.

Type of industries investigated.—Among the 2,600,000 workers involved in the investigations were workers who helped to attain the 1942 quota of ships, airplanes, guns, and automotive vehicles, and helped to produce the machinery, radio equipment, uniforms, and other materials needed for the maintenance of the armed forces. For example, it was estimated that in the early part of 1942 some 500,000 workers were engaged in shipyards and about 700,000 in aircraft plants in the whole country. The 29 States reported investigations in such industries which employed 707,000 workers at the time the investigation was made or, roughly, 59 percent of the workers thus engaged in the whole country. If the total employment in the transportation equipment industries were limited to only those States reporting—several of the large States like New York and Ohio are not listed among these—the comparison would reveal still greater proportions.

The Bureau of the Census estimates that there were 1,263,215 workers in the country engaged in the iron and steel industries in 1940. The 504,000 workers served by the reporting units in these industries represent 40 percent of all the workers thus engaged in the whole country at the time the census was taken. Another strategic industry is the manufacture of machinery and parts. The 408,000 workers contacted in these industries represent 38 percent of all the workers thus engaged in the country in 1940. It is evident from these few examples that the industrial hygiene units are extending their services to the essential war industries.

However, the work of the industrial hygiene units is not limited to these industries only. Although the three groups just mentioned accounted for 42 percent of the 5,688 plants and 64 percent of the

2,600,000 workers, many other types of manufacturing industries were investigated, as well as a number of the mining and service industries. Among these were textile mills, plants engaged in making clothing for the armed and civilian forces, plants producing food products, lumber and furniture, leather goods, and stone, clay, and glass products.

Experience has demonstrated that the manufacturing industries offer most of the industrial health problems. It is significant that 86 percent of all the plants investigated and 95 percent of the workers were in these industries.

Size of plants investigated.—No plant is too small or too large to receive or to require industrial hygiene services. It has been reiterated over and over again that in small plants of the size employing less than 500 workers, industrial health services are in general lacking or at a minimum. The analysis showed that 83 percent of the plants receiving industrial hygiene services were of this size, and only 17 percent employed more than 500 workers. Three percent of the plants were of the size employing more than 2,500 workers and contained one-half of all the workers affected by the services.

Nature of investigations.—Often more than one investigation is made in the same plant during the course of a year. The analysis revealed that close to 6,000 initial investigations were made in the 5,688 plants. An investigation, as the term is used throughout this report, may refer to an inspection, a preliminary survey, an engineering study, or a medical study or survey. It may include one or all of these phases.

Unless a request is received to investigate a particular hazard in the plant, a survey of the plant is first made in order to obtain information on materials and processes associated with each occupation or operation. The results are then used as a guide in selecting particular occupations or operations for further study. Over half of the investigations, 59 percent, were of the survey type. Twenty-two percent of the investigations were engineering studies, 15 percent were predominantly medical studies and surveys, and 4 percent were follow-up investigations in plants which were first visited during the previous fiscal year.

In connection with the engineering studies, some 10,000 samples of air and materials were collected for analysis, and countless numbers of determinations were made in the field, such as velocity measurements, illumination readings, and ventilation measurements. Engineering studies often involve the review or the actual drawing up of plans for control measures, and the subsequent check-up on the adequacy of the installed control measures.

Moreover, engineering studies are made because a specific operation or process is suspected of presenting a potential health hazard. The reports submitted by the reporting units mentioned hundreds of such conditions and materials, but exposures to silica dust were

mentioned most frequently. Among others, in order of frequency mentioned, were exposures to solvents, lead and its compounds, dermatitis producers, and spray painting, welding, and changes in temperature. Evidently those materials and conditions that have long been associated with adverse health conditions are still sources of trouble for management of industry today.

A medical survey or study may involve the actual physical examinations of workers, if indicated, or assistance with these examinations; the taking of chest X-rays or reading the films; the promotion and assistance in establishing systems of recording absenteeism in the plant, so that the plant can estimate the causes of absences and take appropriate measures for lessening the absenteeism rate; assistance in outlining the needs of an adequate medical department, and in establishing complete industrial hygiene programs in the plant.

At least 15,000 visits were made to these plants and others during the course of a year by the reporting units. At a glance, this number seems impressive. Actually it is an understatement, since it is impossible to determine the number of visits with any degree of uniformity. This is particularly true for the engineering studies. A study may take one day and involve one visit; it may take several days, or even months to complete. This number of plant visits, however, is some indication of the number of contacts made with industry.

Sources of investigations.—Because the program of each industrial hygiene unit is so closely allied with the war effort, much of the work done is self-initiated. Over one-half, or 64 percent, of the initial investigations were of this type, whereas 31 percent were made in response to requests for service, and 5 percent were investigations of occupational diseases reported through an official agency or by management itself.

Industry and labor accounted for most of the requests for services. Management itself made 38 percent of the requests, indicating the desire on its part for such services. State labor departments and industrial commissions accounted for 28 percent, and labor unions and employees for 10 percent, indicating the recognition on the part of the official labor agencies and labor of the need for such services, as well as their cooperation. Official State and local agencies made 13 percent of the requests; another 9 percent were complaints made anonymously or by groups of individuals; and the remaining 2 percent included requests from Federal agencies, insurance companies, and private physicians.

Occupational disease investigations.—Although not a major activity of the units, an extremely important activity is the epidemiological investigation of cases of occupational illness among the workers. At present 25 States in the country have enacted legislation compensating workers for one or more occupational diseases. Stimulating such

reporting, and suggesting systems for reporting, is usually an important activity of industrial hygiene units. But like many other activities that take long to promote, progress has been slow, especially since the emphasis has been on rendering service to essential war industries without delay.

Fifteen States reported that they made 215 investigations of 2,465 cases of occupational diseases in 191 plants which employed approximately 200,000 workers. However, only 5 of these States reported more than 100 cases each. Such investigations usually involve detailed study of particular operations and processes suspected of causing the disease, and medical examinations including laboratory tests of affected workers.

It is difficult to ascertain the extent to which the speeded war production drive has increased the incidence of occupational diseases and injuries. General data are lacking, but from isolated reports it is known that an increase has occurred in the number of injuries occurring on the job as well as in the number of occupational diseases. For example, in one State the number of occupational diseases reported in the 1942 fiscal year increased 45 percent over the 1941 fiscal year. Moreover, most of the diseases which were investigated occurred in the strategic war industries, such as shipbuilding, aircraft, machinery, and iron and steel production.

The most common types of occupational diseases investigated were conjunctivitis and dermatoses, accounting for 61 percent and 25 percent of the 2,465 cases, respectively. Conjunctivitis cases occurred chiefly in shipbuilding industries among welders, burners, and workers in similar occupations. Keratoconjunctivitis, which at one time assumed epidemic proportions in many States, was first investigated by one of the reporting States, and, after considerable study, attributed to possible nonoccupational origin. Dermatoses occurred in practically all types of industries. The chief causative agents were given as cutting oils, chlorinated hydrocarbons, alkaline compounds, solvents, and food products.

Ninety-seven cases of cotton fever were investigated in connection with mattress-making projects and textile industries using infected cotton. Among other cases investigated were: Lead poisoning, 69 cases; silicosis (diagnosis was not confirmed for all), 33 cases; anthrax, 39 cases, several of which were fatal; metal fume fever, 14 cases; mercury poisoning, 7 cases; carbon monoxide poisoning from solvents, 6 cases; and respiratory infections, 28 cases.

These cases are not necessarily an indication of the frequency with which they occur in industry. Nor do they represent all cases of occupational diseases reported to the central agency in those States with a compulsory reporting system. These cases represent only that

portion of States' activities dealing with direct control of reported occupational diseases.

Recommendations made.—Perhaps no other phase of activity of the industrial hygiene services reflects so strikingly the effect of the war effort on problems needing solutions in industry as the type of recommendations made. Recommendations for improvements in the plant health and welfare services, and in the control of potential health hazards, were made by the reporting units for 30 percent of the 2,600,000 workers, and reported as carried out by management for 45 percent of those affected.

It is significant to note that at a time when plants were converting, or expanding, and new ones were being built, recommendations which involved the most workers concerned improvements or expansions in medical services in the plant. In fact, 47 percent of the workers for whom any recommendation was made were thus affected, and for almost one-half of these, or 48 percent, the recommendations were reported as complied with. These included suggestions for general industrial health programs when warranted by the number of workers, installations or improvements in facilities of first-aid rooms, the procurement of adequate personnel for first-aid work, and, frequently, the adoption of systems of reporting absenteeism in the plant. The large proportion of workers affected by compliances with the recommendations may reflect on the part of industry the recognition of the value of such services in keeping down sickness and accident rates.

However, other recommendations which affected 12 percent of the workers called for expansion of prevailing medical programs to include preplacement and particularly periodic medical examinations or chest X-rays of workers in hazardous occupations. These were complied with for only 8 percent of the workers involved, as contrasted with almost one-half for the former type of recommendation. A further study of the reports indicates that, although the expanding war industries are in general willing to provide the necessary emergency medical services, the rapid hiring of workers and high labor turn-over has in many cases interfered with having medical examinations made.

Improvements in the sanitation facilities were suggested to management for 31 percent of the workers and were reported as carried out for 40 percent of these workers. Such recommendations involved the installation of additional toilet and washing facilities, lockers for workers, improved drinking facilities, and cleanliness of such facilities.

Personal protective measures were recommended for 25 percent and carried out for only 10 percent. These included protective clothing, especially for women, protective ointments and creams in preventing dermatoses, personal respiratory protective devices, and improvement in personal hygiene practices in the prevention of occupational diseases.

Recommendations on the engineering control of air contaminants were made for a relatively small proportion of workers, 14 percent. These included specific types of improvements in the local exhaust ventilation systems, and enclosure or isolation of hazardous operations and processes.

These improvements were reported as complied with for 44 percent of the workers so involved, and probably would have been higher had the proper equipment been made available. The reports show that time and time again difficulties were experienced in obtaining the necessary control equipment because of priorities or late deliveries. Moreover, many plants are now engaged in making war products that have no value in peacetime, and do not find it economical to install permanent equipment. The makeshift control measures are often found to be adequate over temporary periods of time if given proper care.

Many other kinds of recommendations were also made, such as improvement in the general ventilation of the workroom, in illumination, especially on the night shift, housekeeping of the workrooms, the reduction of noise, and the prevention of fatigue and crowding.

PROMOTIONAL AND EDUCATIONAL ACTIVITIES

The more recent endeavors of the industrial hygiene services have been extended to health promotion and education on various phases of industrial health. As a result of the in-migration of workers to newly industrialized areas, many plants find it necessary to make some provision for certain health services to the families of workers as well as to the workers themselves, in order to keep the worker on the job. Among these are services concerned with the nonoccupational illnesses, such as colds and, at times, with outbreaks of dysentery and other communicable diseases caused by inadequate sanitary facilities in the community. Several States are assisting industry with venereal disease and tuberculosis control programs. For example, a number of the units are promoting tuberculosis case-finding programs in industry. One unit alone had X-rayed some 44,000 workers during the 1942 fiscal year.

Several States are doing a great deal of work in promoting the recording and reporting of absenteeism. In fact, a few State units receive such reports and analyze them for industry, and others are prepared to do so.

Within the past two years a number of States have added the services of nursing consultants in industrial hygiene to their staffs. In January 1943, 14 States had 16 such consultants. Their functions are primarily concerned with the improvement of existing nursing services in industry and the stimulation of such services where they are nonexistent and needed. A major phase of their activities is

promoting part-time nursing services to industry by utilization of the local visiting nurse associations. These consultants further advise management on health education among workers in the plants, nutrition, elimination of fatigue, war problems resulting from the employment of large numbers of women in industry, and on functions of nurses in industry. The recent industrial nursing survey, in which the nursing consultants participated actively, will furnish them a guide in further advising industry on acceptable practices for industrial nurses.

More recently, State health departments have shown an interest in promoting dental programs in industry. This activity was still in its early stages of development during the 1942 fiscal year, but since then 3 State industrial hygiene divisions have added to their staffs the services of full-time dentists, and in 26 other States the divisions of dental health and industrial hygiene are beginning to cooperate in the establishment of plant dental programs in industry.

In the field of health promotion the industrial hygiene services have been particularly active. No count was made of their publications on various phases of industrial hygiene work, of the informative pamphlets, bulletins, and circulars which were distributed to industry, local physicians, and others interested, nor of the speeches, talks, radio lectures, and lectures delivered at schools and universities and before other groups, but these were quite numerous.

Comparison with the 1941 fiscal year.—Although the present analysis represents the third one of its kind (*2*, *3*), variations from previous analyses prevent satisfactory comparisons. Uniform reporting of industrial hygiene activities in the country is still a fairly new undertaking, and minor inconsistencies in the interpretation of certain factors by the units are still likely to occur.

On the whole, it can be stated that the reporting units investigated fewer plants in the 1942 fiscal year than in the 1941 fiscal year but that the plants visited in 1942 employed more workers. More units submitted reports in the past year, but approximately the same number of personnel carried on the field activities. It is possible that personnel disruptions and the time involved in recruiting and training new personnel may be reflected here.

The proportion of request work was slightly greater in the past year and more requests for services came from the State labor departments and industrial commissions. No gain was made in the investigations of occupational diseases, although more cases occurred in the plants where such investigations were made in the 1942 fiscal year.

The most notable difference is apparently in the amount of follow-up work done on recommendations. The reporting on this phase is subject to fewer inconsistencies, thus making comparison quite reliable. Recommendations were made for more workers in the 1942 fiscal

year in proportion to the total number of workers involved in the investigations but were reported as carried out for less workers. In fact, the percentage is 40 for the 1942 fiscal year and 67 for the 1941 fiscal year. Here again wartime disruptions in personnel and other difficulties are reflected. Many reports received from the industrial hygiene services indicate that with the personnel available follow-up work had to be curtailed in order to visit as soon as possible each new industry working on Government contract.

CONCLUSION

In conclusion it can be stated that all the available resources of the State and local industrial hygiene services are geared to the war effort. The task set for them is tremendous from the standpoint of the size and composition of the manpower as well as the complexity of the industrial health problems. Their contribution to the war effort in terms of plants and workers served is not great, but it is commensurate with their resources for doing such work.

The programs of the industrial hygiene services are being constantly broadened to include all phases of industrial health. Rendering technical assistance to industry is but one part of their work, although a major one. More States have added the services of nursing consultants to their staffs and more recently have begun to promote dental programs in industry. They are stimulating rounded out industrial health programs, especially in the new industrialized areas where the chief contact with the worker and even his family is through the plant. Such programs are developed with some thought for the postwar period.

On the other hand, little gain has been made in the field of occupational disease reporting and absenteeism reporting. The amount of the follow-up work on recommendations made has decreased.

It is evident that in order to reach more workers, to maintain the gains in general health promotion, and to meet in part the shortcomings of present programs the resources of the industrial hygiene units will need to be increased. However, this may not be possible in view of the shortages of professional personnel and limited budgets. The alternative, then, is the more effective utilization of personnel in these units and of community resources now available. The professional personnel can be used in key positions to train and direct the endeavors of untrained personnel and to strengthen the working relationships with community agencies concerned with health matters.

For example, the health programs of official agencies concerned with venereal disease and tuberculosis control and with improved nutrition can be more closely integrated with those of the industrial hygiene services. More effective use of labor-management committees can be made. There are some 2,000 such committees in war industries today

whose efforts could be directed toward the reduction of illness and accidents in the plant and in the community. Many units are collaborating to their mutual benefit with State medical society committees on industrial health affiliated with the Council on Industrial Health of the American Medical Association. These committees are developing industrial health programs, setting up standards for medical practice in industry, and sponsoring emergency educational institutes on industrial hygiene.

Just recently an arrangement was made between the Division of Industrial Hygiene and the Office of the Provost Marshal General whereby the State units can benefit from inspections of war plants made by officers of the latter agency. These officers will complete an additional form on potential health hazards in the plant and will submit this form with the request, if so indicated, that a further study of the plant be made by the State unit concerned.

These are but a few of the ways in which the industrial hygiene services can compensate for limitations in their own resources and still strengthen their contribution to the war effort.

REFERENCES

(1) Transactions of the Second Annual Conference of Governmental Industrial Hygienists, held at Washington, D. C., April 26–28, 1939. Division of Industrial Hygiene, National Institute of Health, U. S. Public Health Service, Washington (1939). Pp. 189–199. (Mimeographed.)

(2) Transactions of the Fourth Annual Meeting of the National Conference of Governmental Industrial Hygienists, Bethesda, Md., February 17 and 18, 1941. Division of Industrial Hygiene, National Institute of Health, U. S. Public Health Service, Washington (1941). Pp. 162–181. (Multilithed.)

(3) Trasko, V. M., and Bloomfield, J. J.: An analysis of industrial hygiene activities in State and local health departments, 1940–41. Pub. Health Rep., 57: 853–872 (June 5, 1942). Reprint 2385.

STUDENT WAR NURSING RESERVE

The Bolton-Bailey Act providing for the training of nurses for the armed forces, governmental and civilian hospitals, health agencies, and war industries through grants to institutions giving such training was passed by the House on May 14, 1943, and by the Senate on June 4, 1943. The program is under the administration of the United States Public Health Service. The legislation was introduced into the House by Congresswoman Frances P. Bolton of Ohio and in the Senate by Senator Josiah W. Bailey of North Carolina.

Although the Act does not specify it, the Public Health Service proposes to carry out the program by establishing a Student War Nursing Reserve. Private industry and the military services are at this time competing for the services of recent high school graduates and college students. It is thought that the provision of free professional training, maintenance, service in an organized government unit,

attractive uniforms and insignia will attract a considerable number of these young women to the War Nursing Reserve. The stipend, while small, will make it possible for student nurses to pay for all personal expenses in connection with their nursing education.

Under the Bolton-Bailey Act, the usual training period for nurses will be accelerated from 36 months to 24 or 30 months in such a way that all essential courses, including clinical experience, will be completed during the shortened period. Student nurses will thus be made available for full-time nursing practice under supervision during the last 12 or 6 months, the cadet period, in approved civilian or military organizations. Besides increasing the nursing supply, the program will also release much-needed dormitory facilities, since cadet nurses will not live in the dormitories.

The Act provides that courses of study and training meet standards prescribed by the Surgeon General after consultation with the Advisory Council and that institutions furnish student nurses, without charge for tuition, fees or other expenses, courses of study and training, uniforms, insignia, and maintenance in accordance with regulations.

Institutions participating in this training program will pay student nurses a stipend of not less than $15 a month during the first 9 months of study; $20 a month during the next period; and not less than $30 a month during the last or cadet period.

Any school which provides adequate clinical experience for its students in the four basic services and whose graduates are eligible for the Red Cross War Nursing Reserve may apply through the Public Health Service for participation in the nurse training program.

No student or graduate nurse is eligible to receive training under this plan unless the nurse signifies her intention to be available for military or other governmental or essential civilian services for the duration of the present war.

The Act also provides for the compensation of institutions furnishing postgraduate and refresher courses of study for graduate nurses, and authorizes the Surgeon General to enter into agreements with nonprofit organizations for the recruitment of student and graduate nurses on a reimbursable basis.

The plan proposed by the Public Health Service makes it possible for student nurses enrolled after January 1, 1941, in one of the schools participating in the training program to become a member of the Student War Nursing Reserve. Each of these students must agree to serve wherever needed for the duration of the war and 6 months thereafter.

Although the Act does not specify the amount of appropriation needed to carry out the program, it is estimated that the cost will be $64,000,000 a year.

A survey of military and civilian nursing needs has been made and it has been determined that 100,000 more nurses are needed than will be available under the present circumstances on June 30, 1944. Every inactive nurse who responded to a recent inventory will be given a refresher course and will be urged to return to active duty. However, these nurses will not fill the existing gap between actual nursing services available and those needed. To meet critical nursing shortages, 65,000 additional student nurses must begin their training this fall.

INCREASE IN INFANT MORTALITY AND INFANT DIARRHEA IN SAN FRANCISCO, CALIF.

Dr. J. C. Geiger, Director of the Department of Public Health of San Francisco, reports an unusually high infant mortality, with diarrhea of the newborn a definite contributing cause, in San Francisco during the current year. For the first 4 months of the year the infant deaths represent 5 percent of the total deaths, as compared with a normal expectancy of between 3 and 4 percent. For the first 4-month period, the infant mortality rate was 41.6, as compared with 38.0 for the corresponding period of 1942. The births for this period in 1943 show a 37 percent increase over the same period in 1942.

The excess of deaths from diarrhea is apparently the most important factor in the increased infant mortality in San Francisco. For the first 4 months of the current year, deaths from diarrhea constituted 15 percent of the total infant deaths, as compared with 8 percent in infants under 1 year of age and 1.7 in those under 1 month for the country as a whole (1941).

Under date of April 3, 1943, the California State Board of Public Health revised the regulations for the control of communicable diseases. Epidemic diarrhea of the newborn is required to be reported by physicians, superintendents or managers of hospitals, dispensaries, or clinics, as formerly. In addition, epidemic diarrhea of the newborn is defined and the isolation of infant patients is required.

Reportable cases of diarrhea of the newborn are defined as follows:

Diarrhea in the newborn up to 3 weeks of age occurring in a hospital giving maternity service. Diarrhea shall be considered to exist when an infant has four or more loose stools in 24 hours, except in the case of entirely breast fed infants who show no other signs of illness and who are gaining weight.

With regard to isolation of the patient, the regulations require that—

The infant patient shall be immediately placed in strict isolation until discharged from the hospital.

Infant contacts shall be kept in strict isolation until discharged from the hospital or institution.

In addition to these regulations the rules and regulations pertaining to maternity homes and hospitals shall be followed.

Detailed instructions regarding isolation procedures have been issued by Dr. Wilton L. Halverson, State Director of Public Health, to all hospitals and maternity homes in the State admitting maternity patients.

PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

April 25–May 22, 1943

The accompanying table summarizes the prevalence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State are published in the PUBLIC HEALTH REPORTS under the section "Prevalence of disease." The table gives the number of cases of these diseases for the 4-week period ended May 22, 1943, the number reported for the corresponding period in 1942, and the median number for the years 1938–42.

DISEASES ABOVE MEDIAN PREVALENCE

Meningococcus meningitis.—The number of cases of meningococcus meningitis dropped from 2,389 for the preceding 4-week period to 2,221 for the 4 weeks ended May 22. The number of cases was, however, almost 7 times the number reported for the corresponding period in 1942 and more than 12 times the 1938–42 median. In 1929 there were 1,116 cases reported during the period corresponding to the one under consideration, the current incidence being the highest since that year.

The table shows, by geographic regions, the number of cases reported for recent weeks in 1943 in comparison with the experience of the 2 preceding years and also that of the peak year 1929. While the incidence for the country as a whole dropped during the current period, the Middle Atlantic and East North Central regions reported the largest numbers of cases for any 4-week period since the beginning of the outbreak. In all other regions the peak apparently was reached during the preceding 4-week period and marked declines were noted during the current 4-week period. Each section of the country has contributed to the epidemic of this disease and the excesses over the 1938–42 median are still significantly large, ranging from almost 5 times the median in the West South Central region to 25 times the median in the Pacific region.

Meningococcus meningitis cases reported by weeks during 1943 with comparative data for the corresponding period in 1942, 1941 and 1929 [1]

Division	1943, week ended—													
	Feb. 27	Mar. 6	Mar 13	Mar. 20	Mar. 27	Apr. 3	Apr. 10	Apr. 17	Apr. 24	May 1	May 8	May 15	May 22	May 29
All regions:														
1943	503	556	525	619	572	595	606	619	549	592	604	481	544	427
1942	87	70	88	91	90	111	112	88	79	80	89	86	81	81
1941	44	56	43	53	54	70	48	53	62	33	53	33	49	38
1929 [2]	303	297	332	325	330	326	338	295	276	283	298	309	235	258
New England:														
1943	52	61	56	76	88	59	79	72	64	64	62	52	50	37
1942	14	17	10	12	11	13	13	7	12	13	14	10	11	10
1941	3	2	3	4	4	4	5	1	2	2	7	0	3	2
1929	6	11	9	7	6	11	9	5	12	5	7	7	8	5
Middle Atlantic:														
1943	108	117	104	125	133	145	115	135	128	159	156	146	169	157
1942	16	14	19	29	31	40	38	29	25	25	23	21	28	18
1941	8	11	7	9	15	14	13	10	14	9	9	6	18	9
1929	61	54	68	55	27	79	55	48	42	52	38	56	46	54
East North Central:														
1943	41	44	58	40	57	67	51	68	86	96	74	63	80	53
1942	7	4	9	7	5	5	8	4	8	3	4	2	3	1
1941	2	8	8	7	4	7	2	12	4	5	7	6	9	2
1929	63	78	89	65	123	115	122	101	102	105	145	132	97	121
West North Central:														
1943	34	43	25	38	81	22	38	55	27	39	26	38	23	19
1942	4	2	2	2	2	3	3	8	2	2	3	3	3	6
1941	1	5	2	4	1	2	2	3	3	2	2	2	5	2
1929	46	49	42	63	30	29	34	40	29	31	27	32	21	29
South Atlantic:														
1943	[3] 104	[4] 105	105	159	95	106	119	131	85	103	111	75	87	[7] 70
1942	20	14	21	19	20	22	20	21	13	17	22	18	17	17
1941	17	10	8	8	13	21	10	12	18	9	12	6	10	5
1929	7	6	15	13	5	10	5	7	8	7	14	15	8	3
East South Central:														
1943	64	45	54	74	53	90	52	44	62	38	61	46	60	24
1942	10	3	6	5	8	6	8	9	12	10	6	4	5	6
1941	8	9	7	8	11	11	11	8	10	5	8	10	1	6
1929	5	2	8	12	6	6	5	14	3	4	1	6	3	5
West South Central:														
1943	29	27	45	48	46	29	66	[6] 35	13	26	24	21	19	13
1942	10	8	15	11	4	8	11	8	1	6	12	13	3	8
1941	1	8	4	5	4	7	3	2	7	0	4	2	2	9
1929	15	13	18	15	13	18	31	11	13	11	10	6	9	6
Mountain:														
1943	18	[5] 25	20	12	8	6	30	18	25	16	13	14	10	17
1942	3	1	1	1	0	1	3	0	1	0	0	4	0	4
1941	2	0	2	2	0	2	1	0	1	0	1	0	0	1
1929 [2]	61	54	56	41	50	34	33	28	35	32	25	27	21	13
Pacific:														
1943	53	89	58	47	61	71	56	61	59	51	77	26	46	37
1942	3	7	5	5	9	13	8	2	5	4	5	11	11	11
1941	2	3	2	6	2	2	1	5	3	1	3	1	1	2
1929	39	30	27	54	70	24	44	41	32	36	31	28	22	22

[1] Similar tables appeared in Public Health Reports for Mar. 19, 1943, p. 494, Apr. 16, 1943, p. 648, and May 14, 1943, p. 777.
[2] Exclusive of Nevada.
[3] Delayed report of 19 cases in Virginia included.
[4] Delayed report of 15 cases in Virginia included.
[5] Delayed report of 10 cases in Arizona included.
[6] Delayed report of 15 cases in Arkansas included.
[7] Delayed report of 4 cases in Virginia included.

The weekly incidence of meningococcus meningitis has fluctuated considerably. There have been 2 peak weeks, March 14–20 and April 4–10, of 619 cases each, and during the week ended May 22 there were more cases reported than during the preceding week. However, it is probable that the numbers of cases will soon decline in all regions as the incidence is usually low during the summer months. During

the week ended May 29, the cases declined in all regions except the Mountain.

Influenza.—For the current period there were 6,337 cases of influenza reported, as compared with 5,196, 7,530, and 5,650 for the corresponding period in 1942, 1941, and 1940, respectively. The 1938–42 median is represented by the 1940 figure. The small excess of cases of this disease over the median appears to be largely due to a relatively high incidence in the South Central region, particularly in Alabama and Texas. In other regions the incidence compares favorably with the median expectancy.

Measles.—For measles the incidence (approximately 108,000 cases) was about 15 percent above the normal seasonal expectancy (approximately 93,000 cases). Excesses over the median were reported from each region except the South Atlantic and West South Central, but the largest excesses were reported from the North Atlantic and East North Central regions. With the exception of the year 1941 when approximately 172,000 cases were reported, the incidence for the country as a whole was the highest for this period in 6 years.

Poliomyelitis.—The number of cases (118) of poliomyelitis reported was about 1.7 times the 1938–42 median. An increase in this disease may be expected at this season of the year; with the possible exception of California, Arizona, and Texas, no State reported more than the normal seasonal increase. California reported 41 cases for the current period as compared with a 5-year median of 21 cases, Arizona 11 cases as against a median of 1 case, and Texas with a median of only 4 cases reported 15 cases for the current period.

Whooping cough.—The number of cases of whooping cough (16,854) was somewhat above the 5-year median of 15,291 cases. Of the nine geographic regions, the West North Central, South Atlantic, and West South Central reported excesses over the 1938–42 median; the New England, Middle Atlantic, and Mountain regions reported declines in the number of cases; in the East North Central, East South Central, and Pacific regions the incidence stood at about the normal median level.

DISEASES BELOW MEDIAN PREVALENCE

Diphtheria.—For the 4 weeks ended May 22 there were 783 cases of diphtheria reported, as compared with 757 in 1942 and a 1938–42 median of 927 cases. In the East North Central and Pacific regions the incidence was higher than it was during the corresponding period in 1942 and more than 20 percent above the 1938–42 median; but in all other regions the incidence was below the normal seasonal level.

Scarlet fever.—While the number of cases (15,612) of scarlet fever was about 14 percent above the figure for the corresponding period in 1942, it was slightly lower than the 1938–42 median. Of the nine

geographic regions only three, the Middle Atlantic, East North Central, and East South Central, reported fewer cases than normally occur during this period. In the New England and Mountain regions the numbers of cases were more than twice the 1938–42 median and in the South Atlantic the incidence was 1½ times the seasonal expectancy; other regions reported minor excesses.

Smallpox.—Of 93 cases of smallpox reported for the current period, 40 occurred in Ohio, 7 each in Iowa and Texas, and 5 each in Indiana and Colorado; no more than 4 cases were reported from any other State. The incidence was about 15 percent in excess of that for the corresponding period in 1942 but it was only about one-third of the median expectancy.

Number of reported cases of 9 communicable diseases in the United States during the 4-week period April 25–May 22, 1943, the number for the corresponding period in 1942, and the median number of cases reported for the corresponding period, 1938–42

Division	Current period	1942	5-year median	Current period	1942	5-year median	Current period	1942	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	783	757	927	6,337	5,196	5,650	108,057	93,056	93,056
New England	21	27	27	4	5	14	10,317	9,578	6,623
Middle Atlantic	120	112	187	96	41	81	30,675	12,447	12,447
East North Central	194	113	157	352	169	301	33,719	11,276	11,276
West North Central	36	73	77	116	93	118	7,756	9,969	7,304
South Atlantic	107	118	152	1,972	1,577	2,012	6,866	7,852	9,119
East South Central	52	64	68	709	374	374	3,062	1,635	1,635
West South Central	124	158	159	2,156	1,850	1,850	3,310	6,894	5,873
Mountain	42	46	58	461	797	476	5,039	8,311	4,054
Pacific	87	46	67	471	290	290	7,313	25,094	6,367
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	2,221	336	181	118	73	70	15,612	11,551	15,980
New England	228	48	11	1	3	1	2,778	1,458	1,206
Middle Atlantic	630	97	44	9	8	7	4,104	3,802	4,606
East North Central	313	12	20	14	8	8	4,013	3,208	5,223
West North Central	126	11	11	4	4	3	1,153	1,041	1,141
South Atlantic	376	74	45	3	20	19	1,104	708	718
East South Central	205	25	32	12	13	9	339	372	411
West South Central	90	34	19	19	11	11	319	174	299
Mountain	53	4	4	12	2	3	1,001	262	437
Pacific	200	31	8	44	4	12	806	526	771
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	93	75	280	286	384	415	16,854	15,291	15,291
New England	0	1	0	36	14	20	1,110	1,632	1,605
Middle Atlantic	0	0	0	44	51	59	2,640	4,149	3,607
East North Central	51	12	59	25	49	71	3,367	3,615	3,331
West North Central	14	9	107	15	19	19	1,063	475	578
South Atlantic	8	8	8	51	108	91	2,657	1,596	2,357
East South Central	9	14	28	25	42	54	641	680	680
West South Central	9	27	51	46	75	75	2,658	998	1,623
Mountain	5	1	32	25	9	21	560	513	926
Pacific	2	3	28	19	17	28	2,158	1,633	2,103

[1] Mississippi, New York, and Pennsylvania excluded; New York City included.
[2] Mississippi excluded.

Typhoid and paratyphoid fever.—The incidence of these diseases during the 4 weeks ended May 22 was the lowest on record for this period. The number of cases (286) was about 75 percent of the number reported during the corresponding period in 1942, and less than 70 percent of the 1938–42 median (415 cases). The total cases included 35 from Massachusetts, 34 from New York, 23 from Texas, 14 from Georgia, and 13 each from Colorado and California—more than 40 percent of the total cases were reported from these 6 States.

MORTALITY, ALL CAUSES

For the 4 weeks ended May 22 there were approximately 37,700 deaths from all causes reported to the Bureau of the Census by the group of large cities. This figure represents an increase of more than 12 percent over the 1940–42 average number of deaths for the corresponding period. Rates for the cities will be published by the Census Bureau when current population estimates become available. With the excessive internal migration that has taken place since 1940, no accurate population estimates can be made, so it is uncertain as to how much of the current increase is due to increased population and how much represents an increased death rate.

DEATHS DURING WEEK ENDED MAY 29, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended May 29, 1943	Corresponding week, 1942
Data for 89 large cities of the United States.		
Total deaths	8,946	7,822
Average for 3 prior years	7,741	
Total deaths, first 21 weeks of year	204,172	185,391
Deaths under 1 year of age	610	531
Average for 3 prior years	492	
Deaths under 1 year of age, first 21 weeks of year	14,099	11,814
Data from industrial insurance companies:		
Policies in force	65,536,014	64,981,793
Number of death claims	12,470	11,135
Death claims per 1,000 policies in force, annual rate	9.9	8.9
Death claims per 1,000 policies, first 21 weeks of year, annual rate	10.5	10.0

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JUNE 5, 1943

Summary

The reported cases of meningococcus meningitis and poliomyelitis for the current week are above the figures for both the preceding week and the medians of the corresponding weeks of the past 5 years. A slight increase for the week is also shown for typhoid fever, although the current incidence and the reported cases to date this year are below both the figures for last year and the 5-year median. Of the other nine common communicable diseases included in the following table, for which comparable data are available, the current incidence of all except diphtheria and smallpox is above the corresponding medians.

A total of 437 cases of meningococcus meningitis was reported for the week, as compared with 423 for the preceding week. Slight increases during the week were shown in all of the nine geographic areas except the New England, Middle Atlantic, and East South Central States. States reporting increases of 5 or more cases (last week's figures in parentheses) were as follows: New Hampshire, 5 (0); Indiana, 9 (1); Illinois, 26 (16); Missouri, 23 (13); Georgia, 8 (1); Florida, 20 (5); Louisiana, 7 (0); Utah, 14 (2); California, 31 (22). A total of 10,720 cases has been reported to date, as compared with 1,716 for the corresponding period last year.

Of the current total of 52 cases of poliomyelitis, as compared with 27 last week and 22 for the 5-year median, 33 occurred in California, where only 9 cases were reported last week. Of the remainder, 6 cases were reported in Texas, 3 in Florida, and 10 cases in 8 other States.

Diseases with accumulated totals for the first 22 weeks of the year above the median figures for the corresponding periods of the past 5 years (medians in parentheses) are as follows: Measles, 444,654 (408,494); meningococcus meningitis, 10,720 (1,062); poliomyelitis 598 (502); whooping cough, 89,019 (87,076). The incidence of these

4 diseases for the first 22 weeks of the year also exceeds that for last year, as does that of scarlet fever, smallpox, the dysenteries, and endemic typhus fever. Cumulative figures for diphtheria, Rocky Mountain spotted fever, tularemia, and typhoid fever are below the corresponding figures for last year.

Deaths registered during the week in 89 large cities of the United States totaled 8,870, as compared with 9,039 for the preceding week and a 3-year average of 8,302. The accumulated total for the first 22 weeks of the year is 215,063, as compared with 195,001 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended June 5, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria: Week ended— June 5, 1943	Diphtheria: Week ended— June 6, 1942	Diphtheria: Median 1938–42	Influenza: Week ended— June 5, 1943	Influenza: Week ended— June 6, 1942	Influenza: Median 1938–42	Measles: Week ended— June 5, 1943	Measles: Week ended— June 6, 1942	Measles: Median 1938–42	Meningitis, meningococcus: Week ended— June 5, 1943	Meningitis, meningococcus: Week ended— June 6, 1942	Meningitis, meningococcus: Median 1938–42
NEW ENGLAND												
Maine	2	0	0	1	------	------	95	113	105	5	3	0
New Hampshire	0	0	0	------	8	------	50	27	23	5	2	0
Vermont	0	0	0	------	------	------	178	155	79	0	0	0
Massachusetts	0	5	3	------	------	------	1,168	1,037	976	17	4	1
Rhode Island	0	0	0	------	------	------	96	220	136	3	0	0
Connecticut	1	0	0	2	1	1	271	404	397	7	0	0
MIDDLE ATLANTIC												
New York	14	9	15	[1] 4	[1] 9	[1] 6	3,205	1,144	2,150	76	18	5
New Jersey	3	1	7	5	2	2	2,041	659	724	27	3	0
Pennsylvania	7	7	16	1	------	------	949	1,044	1,044	32	17	3
EAST NORTH CENTRAL												
Ohio	7	6	8	16	8	8	644	320	320	11	0	1
Indiana	7	3	5	3	10	6	420	111	111	9	0	0
Illinois	30	29	23	12	5	9	1,707	241	241	26	0	1
Michigan [2]	6	3	3	1	------	1	2,279	289	610	9	1	1
Wisconsin	1	0	2	24	22	22	2,457	1,284	1,284	2	0	0
WEST NORTH CENTRAL												
Minnesota	2	3	2	------	1	1	466	391	216	0	0	0
Iowa	4	1	2	------	------	1	109	234	188	2	1	0
Missouri	2	2	2	------	1	1	234	172	187	23	0	0
North Dakota	1	0	0	3	1	1	11	15	15	0	0	0
South Dakota	0	1	0	------	------	------	602	27	4	3	0	0
Nebraska	2	0	4	2	2	------	190	290	160	1	0	0
Kansas	4	1	1	------	9	2	402	214	358	3	2	0
SOUTH ATLANTIC												
Delaware	1	0	0	------	------	------	47	6	7	1	0	0
Maryland [2]	2	5	1	2	------	2	186	195	129	14	1	1
Dist. of Col.	0	1	3	------	------	------	104	59	59	5	1	1
Virginia	5	7	7	94	95	71	538	97	607	[3] 15	1	1
West Virginia	4	0	3	2	2	5	32	108	108	4	2	1
North Carolina	7	10	8	------	------	1	235	439	459	15	1	0
South Carolina	0	3	3	145	154	154	103	105	105	3	0	1
Georgia	2	0	3	2	12	12	58	103	106	8	1	0
Florida	2	0	4	36	------	1	127	73	73	20	0	0
EAST SOUTH CENTRAL												
Kentucky	2	3	3	11	------	2	111	50	79	6	1	1
Tennessee	2	0	3	4	7	18	120	151	151	7	1	1
Alabama	3	1	4	33	18	18	116	77	148	1	1	3
Mississippi [2]	5	3	3	------	------	------	------	------	------	1	2	1
WEST SOUTH CENTRAL												
Arkansas	2	7	3	2	7	7	43	77	108	2	1	0
Louisiana	2	2	4	6	------	4	35	62	27	7	0	0
Oklahoma	2	2	3	28	30	22	25	57	127	2	0	0
Texas	13	17	16	403	239	181	345	423	423	3	1	1
MOUNTAIN												
Montana	0	0	0	4	4	3	70	88	88	0	0	0
Idaho	0	0	0	------	------	------	29	57	37	2	0	0
Wyoming	0	1	1	15	------	------	94	32	24	0	0	0
Colorado	8	4	6	65	31	8	503	336	178	1	0	0
New Mexico	1	1	1	------	------	------	17	45	45	0	0	0
Arizona	3	1	1	44	36	36	34	62	35	3	0	0
Utah [2]	1	0	0	2	1	1	94	811	344	14	0	0
Nevada	0	0	------	------	------	------	20	13	------	1	0	------
PACIFIC												
Washington	1	1	1	1	3	------	115	425	320	2	0	0
Oregon	2	0	1	15	3	7	155	102	79	8	0	0
California	11	13	15	38	33	33	741	4,202	624	31	3	2
Total	174	153	183	1,026	754	754	21,671	16,646	16,646	[3] 437	68	49
23 weeks	5,471	5,743	7,082	74,749	76,050	147,113	444,654	408,494	408,494	10,720	1,716	1,082

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended June 5, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1938-42	Week ended—		Median 1938-42	Week ended—		Median 1938-42	Week ended—		Median 1938-42
	June 5, 1943	June 6, 1942		June 5, 1943	June 6, 1942		June 5, 1943	June 6, 1942		June 5, 1943	June 6, 1942	
NEW ENGLAND												
Maine	0	1	0	24	4	4	0	0	0	0	0	0
New Hampshire	0	0	0	8	28	5	0	0	0	1	1	0
Vermont	1	0		14	19	10	0	0	0	0	0	0
Massachusetts	0	0	0	381	244	138	0	0	0	0	2	2
Rhode Island	0	0	0	17	9	8	0	0	0	2	0	0
Connecticut	0	0	0	78	10	39	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	0	0	0	477	267	339	0	0	0	9	5	5
New Jersey	0	0	0	68	107	119	0	0	0	1	0	1
Pennsylvania	[4] 0	0	0	189	234	271	0	0	0	3	11	9
EAST NORTH CENTRAL												
Ohio	0	0	0	191	211	232	1	1	1	0	1	3
Indiana	0	0	0	53	44	78	2	1	1	0	3	3
Illinois	0	1	0	116	142	277	1	8	9	0	3	3
Michigan [3]	0	0	0	99	38	238	0	0	1	0	0	1
Wisconsin	0	1	1	292	111	109	0	5	2	0	0	1
WEST NORTH CENTRAL												
Minnesota	0	3	0	51	35	55	0	0	7	0	1	1
Iowa	0	0	0	34	26	26	0	0	8	1	1	1
Missouri	0	0	0	81	43	43	0	1	2	6	6	6
North Dakota	0	0	0	1	16	2	0	0	0	0	2	2
South Dakota	0	0	0	12	15	9	0	0	3	0	0	0
Nebraska	1	0	0	22	13	13	1	0	1	0	0	0
Kansas	1	0	0	29	42	42	0	0	1	0	0	1
SOUTH ATLANTIC												
Delaware	0	0	0	2	14	5	0	0	0	0	0	0
Maryland [3]	0	1	0	73	67	46	0	0	0	0	4	3
Dist. of Columbia	0	0	0	8	4	11	0	0	0	4	1	1
Virginia	0	0	0	20	15	19	0	0	0	5	1	6
West Virginia	1	0	0	17	17	20	0	1	0	1	3	5
North Carolina	2	0	0	16	16	18	0	0	0	4	2	4
South Carolina	0	0	0	6	1	4	0	1	0	1	4	4
Georgia	0	0	0	10	12	9	0	0	0	9	15	15
Florida	3	0	1	4	2	2	0	0	0	5	3	3
EAST SOUTH CENTRAL												
Kentucky	0	1	0	29	25	25	0	0	1	1	2	5
Tennessee	0	0	0	10	27	38	0	3	3	2	4	9
Alabama	0	3	1	7	16	10	0	1	0	2	2	3
Mississippi [3]	0	0	0	1	5	2	0	0	0	1	6	3
WEST SOUTH CENTRAL												
Arkansas	2	0	0	8	4	4	0	7	5	4	5	5
Louisiana	0	0	0	7	5	2	0	4	1	3	15	11
Oklahoma	0	0	0	16	11	10	0	0	2	0	1	5
Texas	6	3	2	20	35	30	0	0	3	10	11	11
MOUNTAIN												
Montana	0	0	0	9	11	11	0	0	0	1	0	0
Idaho	0	0	0	74	2	4	1	0	0	0	0	0
Wyoming	0	0	0	15	11	4	0	0	0	0	1	0
Colorado	0	0	0	69	29	29	0	3	3	2	3	2
New Mexico	0	0	0	0	2	2	0	0	0	0	0	0
Arizona	1	0	0	5	4	4	0	0	0	0	0	1
Utah [3]	1	0	0	13	9	9	0	0	0	0	0	0
Nevada	0	0	------	0	0	------	0	0	------	0	0	------
PACIFIC												
Washington	0	1	0	16	22	22	1	0	0	0	1	3
Oregon	0	1	1	14	8	8	1	0	1	0	1	1
California	33	1	7	138	105	105	0	0	1	2	3	6
Total	52	17	22	2,844	2,137	2,559	8	36	47	80	128	147
22 weeks	[4] 598	453	502	85,342	78,950	103,806	544	507	1,545	1,316	1,823	1,958

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended June 5, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Whooping cough: Week ended— June 5, 1943	Whooping cough: Week ended— June 6, 1942	Whooping cough: Median 1938-42	Week ended June 5, 1943: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENGLAND												
Maine	19	31	25	0	0	0	0	0	0	0	0	0
New Hampshire	4	3	3	0	0	0	0	0	0	0	0	0
Vermont	15	63	20	0	0	0	0	0	0	0	0	0
Massachusetts	97	240	143	0	0	0	0	1	1	0	0	0
Rhode Island	19	19	24	0	0	0	0	0	0	0	0	0
Connecticut	31	91	47	0	0	0	0	0	0	1	0	0
MIDDLE ATLANTIC												
New York	227	381	343	0	2	6	0	1	0	0	1	0
New Jersey	126	420	191	0	1	1	0	1	0	0	0	0
Pennsylvania	246	233	233	1	1	0	0	1	0	0	0	0
EAST NORTH CENTRAL												
Ohio	146	131	169	0	0	0	0	1	0	0	0	0
Indiana	60	54	47	0	0	0	0	0	0	1	0	1
Illinois	145	268	230	0	0	0	0	1	0	0	1	0
Michigan [2]	164	130	217	0	0	1	0	0	0	0	0	0
Wisconsin	199	211	140	0	0	0	0	0	0	0	1	0
WEST NORTH CENTRAL												
Minnesota	86	31	43	0	2	0	0	0	0	0	0	0
Iowa	38	16	26	0	0	0	0	0	0	0	0	0
Missouri	41	18	28	0	0	0	1	0	0	0	0	0
North Dakota	2	6	6	0	0	0	0	0	0	0	0	0
South Dakota	4	2	3	0	0	0	0	0	0	0	0	0
Nebraska	14	13	13	0	0	0	0	0	0	0	0	0
Kansas	76	63	63	1	0	1	0	1	0	0	0	0
SOUTH ATLANTIC												
Delaware	10	1	6	0	0	0	0	0	0	0	0	0
Maryland [2]	94	50	50	0	0	0	0	0	0	4	0	0
Dist. of Col	30	21	12	0	0	0	0	0	0	0	0	0
Virginia	204	64	68	0	0	0	53	0	0	3	2	0
West Virginia	41	57	83	0	0	0	0	0	0	2	0	0
North Carolina	207	112	197	0	0	1	0	0	0	0	0	3
South Carolina	66	126	69	0	0	48	0	0	0	0	0	0
Georgia	47	62	44	0	0	17	4	0	0	0	1	14
Florida	26	9	20	0	1	2	0	1	0	0	0	4
EAST SOUTH CENTRAL												
Kentucky	29	70	65	0	0	0	0	1	0	0	0	0
Tennessee	42	48	66	0	0	0	1	1	0	1	0	0
Alabama	44	53	53	0	0	0	0	0	0	0	0	10
Mississippi [2]	------	------	------	0	0	0	0	0	0	0	1	1
WEST SOUTH CENTRAL												
Arkansas	52	17	20	0	0	10	0	0	0	0	3	0
Louisiana	2	4	6	0	5	3	0	0	0	0	3	4
Oklahoma	43	4	10	0	0	0	0	0	0	0	0	0
Texas	592	147	274	0	38	161	0	2	0	0	0	13
MOUNTAIN												
Montana	12	14	12	0	0	0	0	0	0	2	2	0
Idaho	8	3	7	0	0	0	0	0	0	1	0	0
Wyoming	3	3	3	0	1	0	0	0	0	0	2	0
Colorado	24	43	28	0	0	2	0	0	0	1	2	0
New Mexico	5	4	13	0	0	2	1	0	0	0	0	0
Arizona	23	14	18	0	0	0	37	0	0	0	0	0
Utah [2]	47	33	51	0	0	0	0	0	0	0	3	0
Nevada	0	6	------	0	0	0	0	0	0	0	1	0
PACIFIC												
Washington	23	41	41	0	0	0	0	0	0	0	0	0
Oregon	23	22	22	0	0	0	0	0	0	0	0	0
California	365	313	335	0	0	15	0	2	0	0	0	0
Total	3,821	3,765	3,765	2	51	270	97	14	1	16	23	50
22 weeks	89,019	84,303	87,076	30	677	4,612	1,139	244	11	86	367	1,017
22 weeks, 1942	------	------	------	33	379	1,821	1,028	188	26	122	409	783

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Exclusive of delayed report of 7 cases in Virginia.
[4] Later information shows 1 case of poliomyelitis in Pennsylvania for the week ended May 29 instead of 2 as previously reported.

NOTIFIABLE DISEASES, FIRST QUARTER 1943

The figures in the following table are the totals of the monthly morbidity reports received from the State health authorities for January, February, and March 1943, and are therefore preliminary and incomplete. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State. The lists of diseases required to be reported are not the same for each State, although the common communicable diseases are notifiable in all the States. Some diseases, however, may be a health problem in some States but not in others. There are variations among the States also in the degree of completeness of reporting of cases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis, while other diseases, such as puerperal septicemia and Vincent's infection, are not reportable in many of the States.

In spite of these known deficiencies, however, these monthly reports, which are published quarterly and annually in consolidated form, have proved of value in presenting early information regarding the reported incidence of a large group of diseases and in indicating a trend by providing a comparison with similar preliminary figures for prior years. To some extent they also give a picture of the geographic prevalence of certain diseases, as the States are arranged by geographic location.

Leaders are used in the table to indicate that no case of the disease was reported.

Consolidated monthly State morbidity reports for January, February, and March 1943

	Anthrax	Chickenpox	Diphtheria	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria	Measles	Meningitis, meningococcus	Mumps	Ophthalmia neonatorum	Pellagra	Pneumonia, all forms	Poliomyelitis
NEW ENGLAND																		
Maine	------	871	2	------	------	------	------	181	------	20	------	132	142	913	------	------	238	4
New Hampshire	4	357	------	------	------	------	------	571	------	12	------	534	10	113	------	------	21	------
Vermont	------	531	------	------	------	------	------	1,168	------	24	------	4,183	8	534	------	------	40	------
Massachusetts	------	4,243	24	------	14	------	8	12,864	------	------	2	10,967	226	3,304	59	------	[1] 1,087	10
Rhode Island	------	501	13	------	------	------	7	1,830	------	58	1	338	277	624	2	------	121	2
Connecticut	------	2,442	4	2	18	------	5	3,343	------	80	2	4,751	57	1,640	1	------	1,345	------
MIDDLE ATLANTIC																		
New York	4	9,377	148	116	371	------	11	[2] 4,365	------	[3] 182	22	20,112	559	[2] 1,873	21	------	8,823	8
New Jersey	2	10,298	54	5	------	------	5	11,255	------	221	1	12,612	286	5,917	1	------	1,816	4
Pennsylvania	8	9,752	129	3	9	------	3	4,508	------	24	1	31,650	286	6,309	3	------	1,831	7
EAST NORTH CENTRAL																		
Ohio	------	8,537	129	1	------	3	6	1,228	------	155	5	2,604	81	4,412	117	------	1,280	8
Indiana	------	1,254	65	------	------	1	1	3,213	------	234	1	3,306	75	1,313	------	------	619	6
Illinois	1	5,522	143	10	49	------	18	6,293	------	191	9	7,266	137	2,642	94	------	4,084	5
Michigan	------	7,161	56	------	15	------	------	1,852	1	113	16	4,750	125	2,653	5	------	1,878	6
Wisconsin	------	6,612	33	------	------	------	4	33,488	------	817	------	9,067	74	8,043	------	------	[1] 627	3
WEST NORTH CENTRAL																		
Minnesota	------	2,421	59	9	24	1	1	------	------	26	------	567	36	------	------	------	281	3
Iowa	------	1,278	36	------	------	------	3	1,280	------	32	2	2,557	11	1,327	------	------	337	4

Missouri		744	73	4			4			68	15	3,084	204	988	1		634	6
North Dakota		451	3				1			240	1	566	4	744			395	
South Dakota		303	60							5		1,509	9	205			60	3
Nebraska		1,412	30				1			353		2,729	25	1,465			132	7
Kansas		2,598	70	1	1		7	2,746		121		4,367	68	1,889			676	5
SOUTH ATLANTIC																		
Delaware	1	143	4							7		465	13	43			9	
Maryland		1,581	50	1	4	1		1,370		129	7	643	209	546	2		1,284	
District of Columbia		381	9				1			34	1	889	43	129			640	2
Virginia		1,202	123	1		321				8,194	7	4,058	385	834		4	2,762	10
West Virginia		623	57							298		240	27	346			125	4
North Carolina		1,999	148	3	7					774	39	633	156			1	680	4
South Carolina		763	388	1	20		7	444	146	10,041	838	608	162	2,164	4	132	1,895	5
Georgia		627	70	6	11	13	2		756	1,871	54	1,114	55	1,043		11	1,171	5
Florida		1,100	56	12	3		4			81	16	340	74	1,042		2	420	10
EAST SOUTH CENTRAL																		
Kentucky		1,520	70		7		4	227		122		8,054	109	975		1	432	12
Tennessee		820	69	4		7	4	580	9	1,055	9	2,307	89	720	10	6	1,025	5
Alabama		621	103	3			3	416		2,850	514	896	116	588		25	1,969	7
Mississippi		2,468	74	277	1,289				1,417	23,745	2,287	4,796	161	3,866	22	468	6,718	6
WEST SOUTH CENTRAL																		
Arkansas		654	104	10	19			1,076		1,773	43	1,371	39	412		4	1,147	5
Louisiana	2	208	66	18	7		2		38	136	45	1,373	104	545		4	798	2
Oklahoma		388	76	2	9		1		25	1,318	53	1,149	35	131		3	714	3
Texas	1	4,324	504	105	1,959		23			20,384	970	6,154	168	3,299	14	233	4,634	66
MOUNTAIN																		
Montana		575	21	1	2	4	1	172		225		2,190	6	1,177			25	
Idaho		357	72					644		17	1	1,549	17	869			54	1
Wyoming		221	3	2			4	61		588		1,009	13	573			50	2
Colorado		1,930	122	2	4		3			661		4,633	29	1,454			565	2
New Mexico		250	18	1	2	3	1	152		32	1	356	10	165		2	403	4
Arizona		953	16			167	3	199		1,533	5	348	28	561		4	767	12
Utah		1,853	11			5		599		708	4	5,148	60	1,068			394	6
Nevada		242								51		230	13	50			60	
PACIFIC																		
Washington		2,362	94	1	2		3	1,775		102	2	10,256	140	3,229			278	12
Oregon		611	12	5		2				384	1	5,018	141	1,515			584	4
California		22,193	347	24	88		10	16,065		1,144	41	7,543	475	9,541	11		[1] 1,551	54
1943	23	127,634	3,917	630	3,929	528	161	113,965	2,391	81,222	5,016	201,111	5,577	83,743	367	900	57,938	335
1942	29	128,372	4,221	492	1,839	1,094	106	47,024	7,050	86,624	4,781	222,463	911	121,678	573	1,423	52,346	304
Median, 1938–42	18	125,099	4,968	568	1,490	139	149		8,517	153,949	5,367	222,463	690	65,174	531	1,635	61,920	304
Alaska		27	24		4			12		309		163	8	356			45	
Hawaii Territory		411	28	1	20			166	6	10	14	62	14	1,162			[1] 66	10
Panama Canal Zone [3]		128	47	15	10						1,028	54	2	144				

[1] Lobar pneumonia only.

[2] New York City only.

[3] Including terminal cities.

Consolidated monthly State morbidity reports for January, February, and March 1943—Continued

	Puerperal septicemia	Rabies in animals	Rabies in man	Rocky Mountain spotted fever	Scarlet fever	Septic sore throat	Smallpox	Tetanus	Trachoma	Trichinosis	Tuberculosis, all forms	Tuberculosis, respiratory	Tularemia	Typhoid and paratyphoid fever	Paratyphoid fever	Typhus fever	Undulant fever	Vincent's infection	Whooping cough
NEW ENGLAND																			
Maine					157	3	1	1		1	157	138		2			10	10	887
New Hampshire					136	13					66			2			4	10	74
Vermont					132						27						8	4	363
Massachusetts		1			6,052	54			4	1	750	698		12	9	1	3		2,414
Rhode Island					406	28			1		350	340		1			2		405
Connecticut					910	75		1		12	311	305		7	3	1	12		730
MIDDLE ATLANTIC																			
New York		58			6,192	152		1		29	2,454	2,336		39	6	3	44		4,946
New Jersey				1	1,663	48		2	4	14	958			6	1		20		2,280
Pennsylvania					3,569		8			1	1,380		1	55			16		4,200
EAST NORTH CENTRAL																			
Ohio	1	192			3,818	25	32	1	3	1	1,422	1,389	11	19	3		14	21	2,608
Indiana			1	1	1,336	4	96	1	2		651	514	12	14			2	52	459
Illinois		88			2,784	146	18	6	50		1,924	1,740	17	22	1		40	62	2,074
Michigan					1,576	236	1	4	1	1	1,203			21	5		17	52	3,636
Wisconsin					3,500	26	3				215		2	7			18		2,588
WEST NORTH CENTRAL																			
Minnesota					879	97			2		303		1	6			48		987
Iowa		10			941	21	8				161	161	4	16	7		112		300
Missouri					1,375	13	2	2	251		462		7	8			6	9	287
North Dakota					142	2			11		48	34	2				3	4	198
South Dakota					262	6	8				55		1	1	1		1		47
Nebraska					473	21	7				50		1	2			2		98
Kansas					964	24	13		2		139	132	7	6	1		18	44	668
SOUTH ATLANTIC																			
Delaware					111						29	29		2					191
Maryland				1	1,119	49	1	1			952	940		11	1	1	2	3	1,075
District of Columbia					303						528	510		8	3		1		280
Virginia					612	507					780	780	22	36	2	2	6		1,042
West Virginia					433	7	2				404			9		1			564
North Carolina					598	51	14				284	277	3	22		43	2		1,706
South Carolina		91			131		1	2			137		5	10		35	3		486
Georgia					282	163	11	1	18	1	557	1	34	28	4	148	15		385
Florida					140	14					342			10		52	4		229

EAST SOUTH CENTRAL																			
Kentucky					706	31	4				601	678	9	9				5	476
Tennessee	2				703	68		2	1	2	865		39	12		4	8	73	963
Alabama		49	1		250		10	3			673		8	13	1	62	6		404
Mississippi	73				199		4		7		342	334	20	12		8	11		2,789
WEST SOUTH CENTRAL																			
Arkansas		75	1		98	284	16		128		209	197	7	26	1	2	6		440
Louisiana		4			136	5	2	9			366	297	8	43	4	22	10		78
Oklahoma	2				260	96	15				325		4	14		2	3		214
Texas					811		32		38		1,984		6	41	4	243	44		4,565
MOUNTAIN																			
Montana				1	153	20	2		2		82			5			5	11	325
Idaho	1				129	8	5				13	11		2	1				31
Wyoming					744	8			22		15	1	3				1	1	36
Colorado					671	7	2				508			8	3		3		245
New Mexico	4	11	1		55	6	2		13		237	225		17	5		4		246
Arizona					169	87	1		117		341			4					227
Utah					941	1			3		31	25		5			4		428
Nevada					24	26			9		16		1	1			1	21	36
PACIFIC																			
Washington					432	66	2	2			412	388	1	9	5		8	30	324
Oregon					159	8	6	1	4		131			16	9			24	116
California		155			2,439	7	3	12	70	5	2,721	2,585	1	32	6	10	38		4,698
1943	83	734	4	4	50,075	2,513	332	52	733	68	27,061	15,065	237	651	86	640	585	436	52,715
1942	86	483	7	5	51,491	1,999	299	59	784	101	22,221	11,972	234	924		558	624	302	53,103
Median, 1938–42	112	693	7	9	61,317	3,440	1,070	63	784	153	24,961	19,497	265	1,011		326	631	596	56,626
Alaska					11	2					35	34							15
Hawaii Territory					11	2		3	3	6						11			444
Panama Canal Zone [3]					2									17	11				

Actinomycosis: Massachusetts, 1; Illinois, 3; Minnesota, 5.
Botulism: California, 2.
Coccidioidomycosis: Arizona, 70; California, 4.
Conjunctivitis: New Hampshire, 2 (kerato), 11 (epidemic); Massachusetts, 87 (suppurative); Rhode Island, 1; Connecticut, 7 (infectious); Michigan, 67 (also 152 kerato); Maryland, 30 (also 3 kerato); Georgia, 3 (infectious); Oklahoma, 1; Montana, 7; Idaho, 1; New Mexico, 4; Washington, 5; Hawaii Territory, 4 (epidemic).
Dengue: Mississippi, 2; Texas, 11.
Diarrhea and enteritis: New Jersey, 16 (infant diarrhea); Ohio, 29; Indiana, 73 (diarrhea only); Illinois, 6 (diarrhea under 1 year); Michigan, 23 (infant diarrhea); Maryland, 25 (diarrhea only); South Carolina, 1,616 (diarrhea only); New Mexico, 19; Nevada, 15 (infant diarrhea); Washington, enteritis only, (under 2 years, 10; over 2 years, 5).
Food poisoning: Ohio, 11; Illinois, 52; Louisiana, 6; New Mexico, 2; California, 168.
Granuloma: Ohio, 5 (unspecified); Missouri, 1 (inguinale); Tennessee, 20 (inguinale); Mississippi, 244 (inguinale); Louisiana, 5 (inguinale); Arizona, 2 (inguinale); Washington, 3 (inguinale).
Impetigo contagiosa: Ohio, 76; Illinois, 39; Michigan, 239; Kansas, 21; Maryland, 1; Oklahoma, 14; Idaho, 17; Wyoming, 3; Washington, 14; Oregon, 67; Hawaii Territory, 20.
Leprosy: New York, 1; New Jersey, 1; Louisiana, 1; Texas, 1; Colorado, 1; Hawaii Territory, 12.
Lymphocytic choriomeningitis: Massachusetts, 2, Minnesota, 1.
Lymphogranuloma venereum: Missouri, 9; Tennessee, 18; Louisiana, 41; Arizona, 2.
Plague (human): Hawaii Territory, 2. (One death from plague was reported in California on January 10. Onset of case, November 8 or 9, 1942.)
Relapsing fever: Texas, 13.
Weil's disease: Michigan, 4; Hawaii Territory, 3.

WEEKLY REPORTS FROM CITIES

City reports for week ended May 22, 1943

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0		0	35	0	1	0	2	0	0	9
New Hampshire:												
Concord	0	0		0	0	0	1	0	1	0	0	0
Vermont:												
Barre	0	0		0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	0	0		1	335	5	18	0	204	0	0	33
Fall River	1	0		0	124	1	2	0	3	0	1	6
Springfield	0	0		0	24	0	0	0	31	0	0	0
Worcester	0	0		0	65	0	5	0	9	0	0	5
Rhode Island:												
Providence	0	0		0	22	7	2	0	24	0	0	39
Connecticut:												
Bridgeport	0	0		0	6	3	1	0	0	0	0	2
Hartford	5	0		0	55	0	0	0	2	0	6	1
New Haven	0	0		0	22	1	0	0	3	0	0	11
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0		0	48	3	7	0	10	0	0	2
New York	19	4	5	1	1,588	56	71	0	328	0	6	77
Rochester	0	0		0	123	7	3	0	11	0	0	12
Syracuse	0	0		0	87	0	3	0	6	0	0	19
New Jersey:												
Camden	1	0		0	0	1	4	0	0	0	0	2
Newark	0	0	3	0	412	9	3	0	17	0	0	13
Trenton	0	0	1	0	21	1	4	0	5	0	0	0
Pennsylvania:												
Philadelphia	0	0	1	0	421	14	34	0	114	0	1	60
Pittsburgh	1	0	1	1	43	4	19	0	11	0	1	43
Reading	0	0		0	34	0	3	0	2	0	0	3
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0		0	67	2	2	0	25	0	2	6
Cleveland	0	0	8	1	27	6	8	0	45	0	1	25
Columbus	0	0		0	60	1	5	0	5	0	0	1
Indiana:												
Fort Wayne	0	0		0	10	0	1	0	0	0	0	0
Indianapolis	0	0		0	198	2	6	0	20	0	0	6
Terre Haute	0	0		0	11	0	5	0	0	0	0	0
Michigan:												
Detroit	2	0		0	1,764	12	9	0	28	0	0	98
Flint	0	1		0	193	0	0	0	2	0	0	2
Grand Rapids	0	0		0	48	0	2	0	4	0	0	17
Wisconsin:												
Kenosha	0	0		0	1	0	0	0	7	0	0	1
Milwaukee	0	0	2	2	593	1	3	0	137	0	1	71
Racine	0	0		0	2	0	0	0	14	0	0	3
Superior	0	0		0	49	0	0	0	2	0	0	2
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0		1	39	0	1	0	3	0	0	1
Minneapolis	0	0		0	272	0	1	0	22	0	1	15
St. Paul	0	0		0	28	1	6	0	1	0	0	47
Missouri:												
Kansas City	3	0		0	73	2	0	0	22	0	0	7
St. Joseph	0	0		0	18	0	1	0	2	0	0	1
St. Louis	0	0	1	0	40	10	8	0	4	0	1	10
North Dakota:												
Fargo	0	0		0	1	0	0	0	1	0	0	1
Nebraska:												
Omaha	1	0		0	10	0	1	0	3	0	0	6
Kansas:												
Topeka	0	0		0	58	0	0	0	0	0	0	10
Wichita	1	0		0	3	0	2	0	1	0	0	7

City reports for week ended May 22, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	......	0	12	1	2	0	3	0	0	0
Maryland:												
Baltimore	4	0	6	1	141	15	16	0	53	0	0	82
Cumberland	0	0	......	0	0	0	2	0	0	0	0	1
Frederick	0	0	......	0	5	0	0	0	1	0	0	0
Dist. of Col.:												
Washington	0	0	1	0	119	6	8	0	12	0	0	24
Virginia:												
Lynchburg	0	0	......	0	2	0	2	0	2	0	0	12
Richmond	0	0	......	1	15	4	3	0	1	0	0	7
Roanoke	0	0	......	0	0	0	0	0	0	0	0	1
West Virginia:												
Charleston	0	0	......	0	0	0	0	0	0	0	0	0
Wheeling	0	0	......	0	0	0	1	0	1	0	0	8
North Carolina:												
Wilmington	0	0	......	0	6	0	2	0	0	0	0	16
Winston-Salem	0	0	......	0	6	0	1	0	0	0	0	28
South Carolina:												
Charleston	1	0	1	0	4	1	1	0	0	0	0	2
Georgia:												
Atlanta	0	0	1	1	23	0	1	0	2	0	0	1
Brunswick	0	0	......	0	3	0	1	0	0	0	0	0
Savannah	0	0	......	0	2	0	2	0	0	0	0	1
Florida:												
Tampa	0	0	......	0	1	0	1	0	0	0	0	1
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	1	0	......	1	92	1	0	0	4	0	1	9
Nashville	0	0	......	1	14	0	0	0	1	0	0	8
Alabama:												
Birmingham	0	0	6	0	29	1	2	0	0	0	0	2
Mobile	0	0	......	0	0	0	1	0	3	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	......	0	5	0	1	0	1	0	0	2
Louisiana:												
New Orleans	1	0	4	0	17	0	9	1	4	0	0	7
Shreveport	0	0	......	0	0	0	3	0	0	0	0	0
Texas:												
Dallas	3	0	......	0	1	1	2	0	3	0	0	15
Galveston	1	0	......	0	2	0	0	0	0	0	1	0
Houston	1	0	......	0	14	0	5	0	2	0	0	0
San Antonio	0	0	1	0	3	0	0	0	0	0	0	5
MOUNTAIN												
Montana:												
Billings	0	0	......	0	8	0	0	0	0	0	0	0
Great Falls	0	0	......	0	26	0	0	0	2	0	0	0
Helena	0	0	......	0	13	0	0	0	0	0	0	4
Missoula	0	0	......	0	27	0	1	0	3	0	0	0
Idaho:												
Boise	0	0	......	0	0	0	0	0	0	0	0	0
Colorado:												
Denver	2	0	6	0	164	0	5	0	7	0	0	10
Pueblo	0	0	......	0	5	0	1	0	0	0	0	8
Utah:												
Salt Lake City	0	0	......	0	49	1	2	0	7	0	0	30
PACIFIC												
Washington:												
Seattle	0	0	......	0	117	8	4	0	14	0	0	18
Spokane	1	0	2	2	28	0	1	0	2	0	0	5
Tacoma	0	0	......	0	1	0	0	0	1	0	0	1

City reports for week ended May 22, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC—continued												
California:												
Los Angeles	4	0	5	1	181	6	10	3	26	0	1	61
Sacramento	1	0	1	1	5	1	1	0	5	0	0	26
San Francisco	2	0	1	0	61	5	14	1	19	0	0	57
Total	57	5	57	16	8,216	200	348	5	1,319	0	18	1,120
Corresponding week, 1942	44	3	61	14	5,861	37	257	2	956	0	13	1,218
Average, 1938-42	69		63	[1] 16	[2] 5,492		[1] 299		1,185	10	22	1,146

Dysentery, amebic.—Cases: Boston, 1; New York, 3; Trenton, 1.
Dysentery, bacillary.—Cases: New York, 23; Philadelphia, 1; St. Louis, 1; Charleston, S. C., 14; Dallas, 1; Los Angeles, 19; San Francisco, 1.
Dysentery, unspecified.—Cases: San Antonio, 22.
Leprosy.—Cases: Philadelphia, 1.
Tularemia.—Cases: Atlanta, 1; Nashville, 1.
Typhus fever.—Cases: New York, 1; New Orleans, 1; Houston, 2.

[1] 3-year average, 1940-42.
[2] 5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1942, 31,045,900)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Small pox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	14 9	0.0	0.0	2.5	1,709	42.2	74.5	0.0	693	0.0	2.5	263
Middle Atlantic	9 4	1.8	4.9	.9	1,239	42.4	67.3	0	225	0	3.6	103
East North Central	3.0	1.0	9 9	3.0	2,995	23.8	40.7	0	296	0	4.0	225
West North Central	9.8	0	2 0	2.0	1,040	25.4	41.0	0	115	0	3.9	205
South Atlantic	8.6	0	15.4	5.1	581	46.2	73.6	0	128	0	0	315
East South Central	5.9	0	35.6	11.9	802	11.9	17.8	0	48	0	5.9	113
West South Central	17.6	0	14.7	0	123	2.9	58.7	2.9	29	0	2.9	85
Mountain	16.1	0	48.2	0	2,347	8.0	72.4	0	153	0	0	450
Pacific	14.0	0	15.7	7.0	687	35 0	52.4	7.0	117	0	1.7	285
Total	9.6	0.8	9.6	2.7	1,380	33.6	58.4	.8	222	0	3.0	188

PLAGUE INFECTION IN CALIFORNIA

Plague infection has been reported proved in a pool of organs from rats in California as follows:

Contra Costa County: In organs from 18 rats, *R. norvegicus*, taken at Richmond, Calif., on March 12.

FOREIGN REPORTS

ANGOLA

Notifiable diseases—January–March 1943.—During the months of January, February, and March 1943, certain notifiable diseases were reported in Angola as follows:

Disease	January		February		March	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Beriberi	11	2	6	1	8	1
Cerebrospinal meningitis			1	1		
Chickenpox	12		9		12	
Dysentery (amebic)	169	8	168	6	141	6
Dysentery (bacillary)	4	1	2	2	2	
Gonorrhea	234	4	264		308	
Grippe	834	4	721	8	1,114	22
Hookworm disease	503	6	363	3	475	5
Leprosy	5		5		11	
Measles	124	3	112	9	111	15
Mumps	23		26		25	
Pneumonia (all forms)	140	14	174	24	181	41
Poliomyelitis	6		1		1	1
Relapsing fever	48		44		39	
Sleeping sickness	99	13	135	6	127	16
Smallpox (alastrim)	482	1	11	1	12	1
Syphilis	425		489		436	
Tetanus	8	3	4	1	6	
Tuberculosis (respiratory)	59	6	41	7	70	4
Typhoid and paratyphoid fever	8		14	3	9	2
Whooping cough	404	10	386	17	391	27
Yaws	708		583		557	

CANADA

Provinces—Communicable diseases—Week ended May 8, 1943.—During the week ended May 8, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		11	2	119	340	51	15	21	70	629
Diphtheria		27		24	1	5				57
Dysentery (bacillary)				32						32
German measles		1		44	106	6	21	23	35	236
Influenza			2		3	5	2		53	65
Measles		85	5	198	2,111	87	184	178	616	3,414
Meningitis, meningococcus		1	1	5	5				3	15
Mumps		78	3	159	1,095	111	63	105	247	1,861
Scarlet fever		38	24	45	227	35	81	20	20	478
Tuberculosis (all forms)	1		3	201	69	30	6	1	39	350
Typhoid and paratyphoid fever				20	1	1		1		23
Undulant fever				1	2					3
Whooping cough		3	1	116	108	74	18	50	95	465

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Senegal—Thies (vicinity of).—For the period May 1–10, 1943, 20 cases of plague, 3 of which were septicemic, with 17 deaths were reported near Thies, in the subdivision of Tivaouane, Senegal.

Smallpox

Iran.—For the period February 13–26, 1943, 40 cases of smallpox were reported in Iran.

Typhus Fever

Hungary.—For the week ended May 15, 1943, 22 cases of typhus fever were reported in Hungary.

Iran.—For the period February 13–26, 1943, 172 cases of typhus fever were reported in Iran.

Iraq.—Typhus fever (endemic and epidemic) has been reported in Iraq as follows: Week ended May 8, 1943—Baghdad, 13 cases; Basra city, 13 cases; Basra Liwa, 27 cases, 9 deaths; Kirkuk, 5 cases; Mosul including 5 Liwas, 39 cases, 4 deaths. Week ended May 15, 1943—Baghdad, 14 cases; Basra city, 17 cases; Basra Liwa, 6 cases with 6 deaths in the Basra area; Diyala, 2 cases; Erbil, 4 cases; Kirkuk, 2 cases; Mosul, 23 cases, 3 deaths; Sulaimaniya, 8 cases.

Morocco—Casablanca.—For the period April 11–20, 1943, 52 cases of typhus fever with 1 death were reported in Casablanca, Morocco.

Rumania.—For the week ended May 15, 1943, 256 cases of typhus fever were reported in Rumania.

Slovakia.—For the week ended May 8, 1943, 17 cases of typhus fever were reported in Slovakia.

Spain.—For the week ended April 10, 1943, 11 cases of typhus fever were reported in Spain.

Yellow Fever

Belgian Congo—Stanleyville Province—Bondo.—On April 16, 1943, 1 death from yellow fever was reported in Bondo, Stanleyville Province, Belgian Congo.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 58 **JUNE 18, 1943** NUMBER 25

IN THIS ISSUE

Poliomyelitis in the United States in 1942

Detection of Leptospirosis Among Wild Rats

Effect of Arsenates on the Storage of Lead

CONTENTS

Public Health Reports

Vol. 58 • JUNE 18, 1943 • *No. 25*

POLIOMYELITIS IN THE UNITED STATES IN 1942, AND A SUMMARY OF ITS PREVALENCE FROM 1933 TO 1942, INCLUSIVE

By C. C. DAUER, *Epidemiologist, District of Columbia Health Department*

As compared with recent years, the incidence of poliomyelitis in the United States during the year 1942 was relatively low, 4,167 cases [1] being reported. In the past 10 years, 1933 to 1942 inclusive, fewer cases were reported only in 1938. The States reporting the largest number of cases, as shown in table 1, were Illinois with 493, New York with 297, California with 353, New Jersey with 254, and Texas with 246. However, the States with the highest rates o incidence per 100,000 population were Nebraska (10.7), Vermont (9.1), Arkansas (7.8), and Arizona (6.8).

The disease did not occur in widespread epidemic form in any part of the country in 1942 but rather in small localized outbreaks. The accompanying map indicates the various areas which were involved. Almost simultaneously cases began to be reported in increasing numbers in Kentucky, Tennessee, and Arkansas late in June and the peak in number of cases was reached in August. In the outbreak occurring in the group of counties in south central Kentucky and north central Tennessee there were two counties which had reported relatively high rates in 1941. Warren County in Kentucky had a rate of 27 in 1941 (10 cases) and a rate of 43 in 1942 (16 cases). Sumner County in Tennessee reported 22 cases in 1941 and 20 cases in 1942, or case rates of 66 and 60, respectively. Simpson County in Kentucky, another county in this group, had a rate of 198 per 100,000 population in 1942. Only 1 case had been reported from this county in the previous 10 years, that being in 1935. Five of the seven counties in Arkansas having relatively high incidence rates in 1942 were among those having high rates in 1937.

The incidence of poliomyelitis was relatively high and more widely distributed in the western parts of Kansas and Nebraska but in these States the increase in number of cases reported did not begin until late in August. The peak in number of cases was reached in October. Several counties involved in the 1942 outbreak in western Kansas

[1] All data for 1942 in this report are provisional

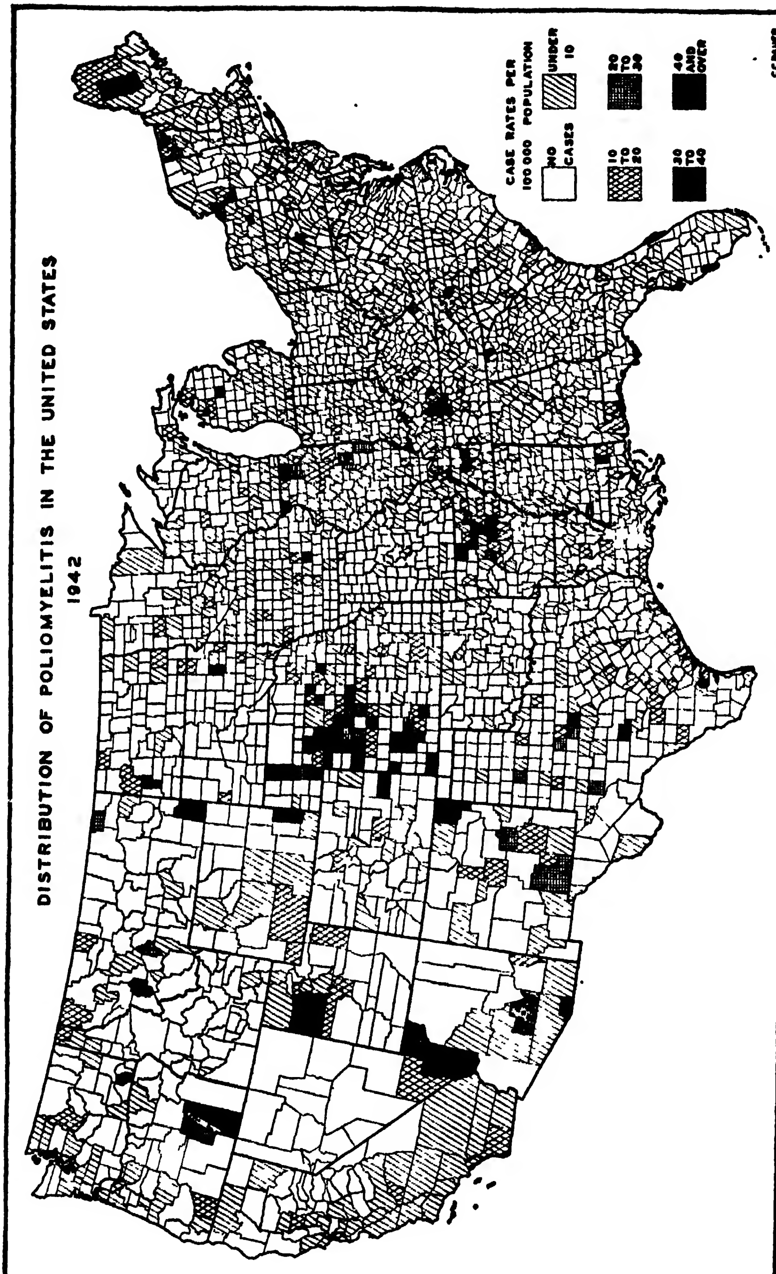

DISTRIBUTION OF POLIOMYELITIS IN THE UNITED STATES
1942
CASE RATES PER
100 000 POPULATION
NO CASES
UNDER 10
10 TO 20
20 TO 30
30 TO 40
40 AND OVER

FIGURE 1.

had high rates of incidence in previous years, some in 1937 and some in 1940. Morton County reported an extremely high rate, 826 per 100,000 population in 1942 (19 cases) and had reported only 1 case in 1930, 1 in 1935 and 1 in 1940. Rawlins County had a rate of 91 (6 cases) in 1942 and had reported no cases since 1930 when 6 cases were also reported. The populations of these two counties in 1940 were 2,186 and 6,618, respectively. Cheyenne County, another with a small population (6,221 in 1940), reported 3 cases in 1930, 4 in 1940, and 6 in 1942, or rates of 43, 64, and 96, respectively.

The occurrence of the disease in Nebraska is also worth noting. Five counties which had not reported any cases from 1933 to 1941, inclusive, reported 1, 1, 2, 2, and 4 cases, respectively. (Case rates were 10.2, 27.7, 25.8, 31.2, and 45.6 per 100,000 population.) This does not indicate an unusually high incidence especially since these counties were located in an area where a general outbreak was occurring. Lincoln County with a rate of 141.7 had the highest incidence for any county in Nebraska in 1942. During the 10-year period from 1933 to 1942, 2 cases were reported in this county in 1934, 1 in 1937, 6 in 1939, 10 in 1940, and 36 in 1942.

Small outbreaks also occurred in Illinois, New York, and New Jersey. Vermont had a relatively high rate of incidence in 1942 as compared with most other States, but none of the counties had excessively high rates. About two-thirds of the cases occurred in a few counties in the northern part of the State. During the 10-year period from 1933 to 1942 this same section of Vermont reported higher rates on the average than the southern half. Caverly's (*1*) reports of the disease from 1910 to 1917, inclusive, also indicated a greater incidence in the northern group of counties.

In Texas the incidence of poliomyelitis was relatively low throughout the spring and summer but late in October increasing numbers of cases were reported and this continued until late in December. One third of all the cases reported in the State in 1942 was reported from Bexar and Nueces Counties, in which are located the cities of San Antonio and Corpus Christi, respectively. In California the increase in number of cases reported began in September and reached a peak in November. Sixty percent of all the cases reported in California in 1942 occurred in Los Angeles County. In States as far south as Texas it is unusual for the incidence of poliomyelitis to be high late in the fall unless an epidemic has occurred during the summer; many of the outbreaks in Southern California in previous years have begun in late spring or early summer. In certain areas of the United States in some years the occurrence of cases late in the fall without an epidemic immediately preceding has appeared to be a forerunner of a more widespread outbreak in the same general area during the following summer.

POLIOMYELITIS CASES AND DEATHS FROM 1933 TO 1942, INCLUSIVE

This report on the prevalence of poliomyelitis by counties in the United States is one of a series (2) begun in 1933. Data are therefore now available for 10 consecutive years. During this period 69,451 cases (see table 1) were reported in the country as a whole and approximately 7,800 deaths were registered. California with 7,595 cases accounted for slightly over 10 percent of all the cases reported and New York State with 7,094 cases accounted for another 10 percent. The largest number of cases reported in any one of the 10 years was 10,839 in 1935 and the smallest number was 1,705 in 1938. The largest number of deaths registered in any one of the 9 years from 1933 to 1941 was 1,004 in 1940, and the smallest number was 478 in 1938. Although a larger number of cases was reported in 1935 with fewer deaths as compared with 1940, the apparent lower fatality rate of 1935 might be explained by the fact that the disease occurred in epidemic form in 1935 in a region in which are located several States which constantly report a relatively large ratio of cases to deaths. Several of these same States also reported a fairly large proportion of nonparalytic cases.

Completeness of reporting.—The completeness of reporting of poliomyelitis cases during the 10-year period from 1933 to 1942 showed a considerable amount of variation among the different States. Various reports have indicated a case fatality rate of about 5 percent during epidemic periods while during periods of low prevalence a fatality rate of 15 to 20 percent is not uncommonly reported. In this discussion the ratio of cases to deaths will be used to indicate the relative completeness of reporting rather than case fatality rates since the latter give an erroneous impression in many instances.

If 5 percent represents a fairly reasonable estimate of the actual fatality rate then there should be about 20 clinical cases reported for each death. During the 9-year period from 1933 to 1941 the highest average ratio of cases to deaths was 17.2 which was recorded in Connecticut. During the same period Massachusetts reported 16.[illegible] cases per death and California reported 15.6. As shown in table 1 Rhode Island, Michigan, Maryland, New York, Montana, and Utah reported more than 10 cases per death which was above the average for the country as a whole. Texas had the lowest ratio with 2.6 cases per death, while Arkansas reported 3.2, and Oklahoma 4.3 cases per death. In many States, especially those with a low general average of cases reported per death, there was a very decided increase in the ratio during years of high prevalence.

One factor which may have influenced the ratio of reported cases to deaths was the proportion of nonparalytic cases included in the totals reported. Data for the years 1936 to 1940, inclusive, which were available for a few States, show that 34 percent of all cases

Table 1.—*Poliomyelitis morbidity and mortality data by States, 1933–42*

Division and State	1942		1933 to 1941			Case rates 1933–42		
	Cases reported	Case rate	Cases reported	Deaths registered	Ratio cases to deaths	Mean	Median	Maximum
New England:								
Maine	43	5.1	502	52	9.6	6.4	4.9	19.0
New Hampshire	10	2.8	159	26	6.1	3.0	1.8	9.5
Vermont	33	9.1	252	28	9.0	6.6	4.9	17.7
Massachusetts	38	.9	2,540	154	16.5	5.9	1.7	32.0
Rhode Island	5	.7	472	32	14.8	6.7	1.1	51.5
Connecticut	49	2.8	793	46	17.2	5.0	2.2	23.4
Middle Atlantic:								
New York	297	2.1	6,797	537	12.6	5.5	2.8	22.2
New Jersey	254	6.1	1,673	171	9.8	4.5	4.5	11.8
Pennsylvania	116	1.2	2,645	339	7.8	2.8	1.9	7.4
East North Central:								
Ohio	157	2.3	2,944	370	7.9	4.6	4.7	9.5
Indiana	99	2.9	1,241	194	6.4	3.9	1.7	19.9
Illinois	493	6.2	3,391	358	9.7	5.2	4.8	9.9
Michigan	163	3.1	3,971	277	14.3	8.4	5.0	23.0
Wisconsin	46	1.4	1,352	151	8.9	4.8	2.6	15.7
West North Central:								
Minnesota	82	2.9	2,133	252	8.5	7.9	6.2	20.5
Iowa	73	2.9	1,676	190	8.8	6.9	2.9	36.9
Missouri	87	2.3	1,036	226	4.6	2.9	1.2	9.9
North Dakota	18	2.8	218	23	9.5	3.1	2.2	11.8
South Dakota	14	2.2	320	44	7.3	4.8	4.1	12.7
Nebraska	141	10.7	570	127	4.5	5.1	1.8	16.0
Kansas	111	6.1	1,153	134	8.6	6.9	3.6	30.1
South Atlantic:								
Delaware	17	6.3	63	10	6.3	2.2	1.6	6.4
Maryland	15	.8	596	44	13.5	3.5	1.9	13.1
District of Columbia	5	.6	275	37	7.4	4.4	2.6	14.3
Virginia	48	1.8	1,448	157	9.2	5.5	2.1	25.7
West Virginia	50	2.6	1,142	192	5.9	6.3	3.4	34.8
North Carolina	80	2.2	1,316	174	7.6	4.2	2.2	19.8
South Carolina	67	3.5	849	143	5.9	4.7	1.7	23.8
Georgia	42	1.8	1,316	173	7.6	4.1	1.6	23.5
Florida	43	2.2	522	92	5.7	3.1	1.8	14.4
East South Central:								
Kentucky	137	4.8	1,364	309	4.4	5.2	4.6	11.5
Tennessee	153	5.3	1,439	258	5.6	5.5	3.7	18.4
Alabama	74	2.6	1,683	210	8.0	6.2	2.4	30.5
Mississippi	58	2.7	844	186	4.5	5.0	2.4	21.0
West South Central:								
Arkansas	152	7.8	630	[illegible]	3.2	3.7	2.0	16.2
Louisiana	57	2.4	600	113	5.3	2.9	2.2	6.2
Oklahoma	17	.7	958	224	4.3	3.6	1.6	18.1
Texas	246	3.8	1,594	597	2.6	3.0	2.2	10.7
Mountain:								
Montana	15	2.7	543	48	11.3	10.3	2.9	60.3
Idaho	6	1.1	331	43	7.7	7.0	3.1	33.0
Wyoming	15	6.0	135	25	5.4	6.1	4.1	16.7
Colorado	38	3.3	519	106	4.9	5.4	2.9	19.4
New Mexico	27	5.1	246	41	6.0	6.2	4.2	26.1
Arizona	34	6.8	358	52	6.9	9.1	6.0	32.0
Utah	28	5.0	300	24	12.5	6.0	4.6	19.0
Nevada	3	2.7	34	5	6.8	3.3	2.0	16.3
Pacific:								
Washington	31	1.8	1,611	171	9.4	9.7	4.4	45.8
Oregon	27	2.5	488	70	6.9	4.8	4.9	8.1
California	353	5.1	7,242	465	15.6	12.5	9.1	56.6
United States	4,167	3.2	65,284	7,357	8.9	5.8	5.7	8.6

reported in Massachusetts were nonparalytic, while Connecticut and California reported 23 and 22 percent nonparalytic cases, respectively. Each of these States, as stated above, had reported a high ratio of cases to deaths. On the other hand, in Tennessee where the ratio was only 5.5 cases per death for the period from 1933 to 1941, inclusive, only 4.4 percent of all the cases were recorded as nonparalytic. In 1936, which was a year of high prevalence in Tennessee, approximately

the same proportion (4.0 percent) were recorded as nonparalytic but the ratio of cases to deaths was 8.5; in 1941 the ratio was 11.7. Alabama and Mississippi reported all cases as paralytic in 1936 and Arkansas did likewise in 1937. These three States reported an average of 8.0, 4.5, and 3.2 cases per death, respectively, from 1933 to 1941, inclusive. In the outbreaks of 1936 and 1941 in Alabama the ratio of cases to deaths rose to 9.7 and 13.4, respectively, for the 2 years. However, the differences in ratios in the two groups of States, i. e., Massachusetts, Connecticut, and California as compared with Alabama, Mississippi, Tennessee, and Arkansas, are not entirely explained by differences in the proportion of nonparalytic cases included in the totals reported. There still remains a significant difference in ratios which probably is due to an actual difference in completeness of reporting.

It should also be noted that during years of high prevalence of poliomyelitis, the States which generally report a large proportion of nonparalytic cases usually report a smaller proportion of such cases than in years of low prevalence of the disease. This may be due to more frequent use of lumbar puncture and other diagnostic procedures during epidemics which might tend to eliminate a greater percentage of questionable cases.

Periodicity of poliomyelitis outbreaks.—During the 10-year period from 1933 to 1942 there was no evidence of cyclic occurrence or any regularity in periods of high and low prevalence. This was true for the country as a whole, in individual States, and in groups of counties. The interval between fairly widespread outbreaks in the country as a whole since 1916 has varied from 1 to 5 years. The interval between outbreaks was as short as 1 year in some States and as long as 8 years in others during the period from 1933 to 1942, inclusive. Outbreaks occurred in Michigan in 1939 and 1940 but different sections of the State were involved in each outbreak. On the other hand, in Alabama where epidemics occurred in 1936 and 1941 the northwestern part of the State was involved in each instance. The outbreak in 1941 involved a larger number of counties, some of which had rather low rates of incidence in 1936. About 3 percent of the counties in the United States had high rates of incidence during 2 or more of the 10 years from 1933 to 1942, inclusive. In this small group, except for the few counties which had high rates for 2 consecutive years, in which case it is probable that the same outbreak extended over from one year to the next, the most common interval between years of high prevalence was between 3 and 5 years.

Intensity of outbreaks of poliomyelitis.—The intensity of outbreaks of poliomyelitis showed wide variations from year to year and also in different parts of the country. The States which showed excessively high rates of incidence (30 or more cases per 100,000 population) in the

1934 outbreak as determined by reported cases were Montana with a rate of 60.3, Idaho with 33.0, Arizona with 32.0, Washington with 45.8, and California with 56.6. In 1935 Massachusetts and Rhode Island had incidence rates of 32.0 and 51.5, respectively. Iowa reported 36.9, Kansas 30.1, and West Virginia 34.8 cases per 100,000 population in 1940. Alabama had a rate of 30.5 in 1941. These data indicate that epidemics of considerable intensity may occur in States with a large proportion of urban population as well as those which are predominately rural, and that in general no section of the country has been free of severe outbreaks.

Slightly over 900, or about 30 percent, of the counties in the United States had incidence rates of 30 or more per 100,000 population during one or more of the 10 years from 1933 to 1942, inclusive. Rates of 100 or more were not an unusual occurrence; the counties in which such rates occurred were located in all sections of the country. An incidence in excess of 300 cases per 100,000 population was reported in 9 counties, the highest recorded being a rate of 1,145 in Luce County, Mich., in 1940. This would mean an attack rate of over 1 percent for the entire county.

On the other hand, certain States or sections of States had relatively low rates of incidence in each of the 10 years from 1933 to 1942. For instance, in most of New Hampshire and in the western part of Pennsylvania the incidence rates based on reported cases were relatively low even in years when severe outbreaks were occurring in nearby areas. Similar conditions were to be found in parts of Missouri, North Dakota, Maryland, Florida, Louisiana, Texas, and Nevada.

Many counties (approximately 8 percent of all counties in the United States) reported no cases of poliomyelitis during the 10-year period. The majority of these have small populations and are located for the most part in the midwest and western sections of the country. In some counties when the disease had not been reported for periods of 5 to 9 years only sporadic cases would be reported while in others the disease appeared as an explosive outbreak.

Between the two extremes of an occasional or no cases reported and definite outbreaks of the disease there were many instances of single or groups of counties which reported cases in small numbers during 5 or more of the 10 years. Such counties for the most part are located in the more densely populated areas of the country.

The question may be raised whether or not certain sections of some States actually have more poliomyelitis than other areas in the same State or in adjoining States. For instance, Vermont has reported more cases than New Hampshire. The former reported 252 cases with 28 deaths from 1933 to 1941, inclusive, while the latter reported 159 cases with 26 deaths. The ratio of cases to deaths was 9.0 and

6.1, respectively. If it can be assumed that the disease is equally severe in both States and that the ratio of cases to deaths is more nearly correct in Vermont, then New Hampshire should have reported 234 cases instead of 159. On this assumption the incidence of the disease actually would be about the same in the two States. As for certain groups of counties having more poliomyelitis than others, as in northern and southern Vermont, no definite conclusions seem warranted without additional data collected over a period longer than 10 years, and for a number of groups of counties.

Age distribution of poliomyelitis cases.—The age distribution of poliomyelitis, like that of certain other acute infectious diseases, has been reported to have undergone some change since the disease first began to be observed and reported in this country. As a basis for comparison data from Caverly's (*1*) reports of the disease in Vermont, Hill's (*3*) report of an epidemiological study of poliomyelitis in Minnesota, Frost's (*4*) report of epidemics in Iowa, Cincinnati, and Buffalo, and Lavinder, Freeman, and Frost's (*5*) report of the 1916 epidemic have been assembled in table 2. These data give a fairly good idea of the age distribution of poliomyelitis cases 25 years ago.

TABLE 2.—*Age distribution of reported cases of poliomyelitis in certain States and cities, 1909–17*

	Number of cases reported by age groups (years)						Percentage distribution of cases by age groups (years)			
	Under 5	5 to 9	10 to 14	15 to 19	20 and over	Age not known	Under 5	5 to 9	10 to 19	20 and over
Vermont, 1910–17	317	195	157		73	-------	42 7	26.2	21 2	9.8
Minnesota, 1909	157	88	34	22	24	7	47 1	26 4	16.8	7.2
Iowa,[1] 1910	151	97	40	26	32	2	43 6	28 0	19 1	9 2
Buffalo, 1912	206	52	7	7	2	7	75.3	18.9	5.2	.7
Cincinnati,[2] 1911	124	20	4	2	---	----	82 6	13 3	4 0	------
Massachusetts, 1916	1,247	363	71	46	87	22	68 7	20.0	6.4	4 8
Rhode Island, 1916	132	43	15	6	1	25	66 8	21 8	10 6	5
Connecticut, 1916	497	179	64	27	34	55	62 0	22 3	11.9	4 2
New Jersey, 1916	1,912	577	129	54	79	23	69 5	21.3	6.5	2 8
New York City, 1916	7,231	1,483	225	78	114	-------	79.2	16.2	3.3	1.2
Northeastern United States, 1916:										
Metropolitan districts	1,657	377	81	37	60	41	74.9	17.0	5.4	2 7
Cities over 100,000	397	85	14	14	15	22	75.6	16 2	5.4	2 8
Cities 50,000 to 100,000	146	35	4	4	6	1	74.8	17.9	4 2	3 1
Cities 25,000 to 50,000	165	67	7	6	14	6	63.7	25.9	5.0	5 4
Cities 10,000 to 25,000	398	130	28	10	14	8	68.6	22.4	6.5	2.5
Cities under 10,000 and rural	1,025	468	145	62	90	47	57 2	26.1	11.6	5 1

[1] Mostly rural cases. Total number of cases in Iowa in 1910 reported to be 654.
[2] Includes cases reported in the vicinity of Cincinnati.

In the epidemic of poliomyelitis in Vermont in 1894, which was studied by Caverly, there were 120 cases reported, 75 percent of which were under 5 years of age, 12.5 percent were 6 to 14 years old, and the remainder, 12.5 percent, were 15 years of age and older. The proportion of cases under 5 years of age in Vermont showed a marked drop for the years 1910 to 1917, inclusive, as compared with the 1894 epidemic, and a still further decrease in the years from 1930 to 1941,

inclusive (see tables 2 and 3). The age distribution of cases reported in Minnesota and Iowa for the years 1909 and 1910, respectively, when compared with recent years also indicates a marked shift in distribution from the younger to older persons. The distribution according to age in Vermont, Minnesota, and Iowa was quite similar not only for the earlier but also for recent years.

The very definite difference in age distribution of cases in urban as compared with rural areas about 1910 to 1916 is quite apparent, as shown in table 2.

In New York City there were 9,131 cases of poliomyelitis reported in 1916, of which 79 percent were under 5 years of age. Buffalo and Cincinnati showed approximately the same distribution. The proportion in this age group in New York City for the period from 1930 to 1941, inclusive, was about one-half for the 1916 epidemic. The shift in distribution was as marked in Massachusetts, Connecticut, and New Jersey. However, the difference in distribution of urban and rural cases according to age has been less marked in recent years than was the case 25 years ago.

The age distribution of reported cases for recent years for certain States and cities is shown in table 3. The data were obtained from official reports or by requests to the various State and city health departments. States not listed were unable to furnish the requested information.

The percentage of cases under 5 years of age has been highest in southern States as compared with other sections of the country. A similar geographical difference is also found in the age distribution of some other infectious diseases. The data for a few cities located in the South, for which information was secured, suggest that there was no higher concentration of cases under 5 years of age in urban than in rural areas. As a matter of fact, a somewhat smaller percentage of reported cases were under 5 years of age in Louisville as compared with the whole State of Kentucky and in Birmingham as compared with the whole of Alabama. The age distribution in Baltimore was no different from that of Maryland as a whole. The distribution in Washington, D. C., has been more like that of northern States which are predominantly rural.

The relatively small proportion of reported cases under 5 years of age and the large percentage of cases 20 years of age and over is quite striking in most of the North Central, Mountain, and Pacific States. Detroit, Cleveland, and Chicago did not show any great difference in distribution when compared with the East North Central States for which data are available. California had a relatively high concentration of cases in the older age groups and Los Angeles and San Francisco differed very little from the State as a whole. In New York City there

TABLE 3.—*Number of cases of poliomyelitis reported by age groups and percentage distribution of cases of known age in certain States and cities, 1930–41*

State and city	Number of cases reported by age groups (years)						Percentage distribution by age groups (years)			
	Under 5	5 to 9	10 to 14	15 to 19	20 and over	Age not known	Under 5	5 to 9	10 to 19	20 and over
Vermont, 1930–41	114	93	70	43	70	21	29 3	23 9	28.9	17.9
Massachusetts, 1930–41	1,313	1,620	838	370	378	14	29.0	35.8	26.7	8.4
Connecticut, 1930–41	649	710	349	154	122	18	32.7	35.8	25.3	6.1
New York,[1] 1930–41	1,941	2,244	1,291	634	611	----	28.9	33.4	28 6	9 1
New Jersey, 1931–41	1,062	1,012	512	218	203	4	35.3	33 6	24 2	6 7
Pennsylvania, 1930–41	1,697	1,244	649	335	280	17	40 3	29.7	23.4	6 6
Illinois, 1930–41	1,378	1,534	906	440	438	20	29 3	32.7	28.7	9.3
Wisconsin, 1930–41	488	542	358	204	282	433	26 0	28.9	30.0	15.0
Minnesota, 1930–41	781	1,094	704	454	526	13	21.9	30.7	32.4	14 8
Iowa, 1930–41	289	453	327	189	188	623	20 0	31 3	35 7	13.0
North Dakota, 1930–41	62	79	51	84	52	65	18 9	24 1	41 3	15.9
South Dakota, 1930–41	119	139	96	60	54	53	25 4	29 7	33 3	11.5
Kansas, 1930–41	532	544	361	237	243	1	27.7	28.3	31 1	12.7
Delaware, 1933–41	11	22	14	8	5	2	18 3	36 6	36 6	8.3
Maryland, 1930–41:										
White	208	215	116	60	47	-------	31.2	33 3	27 3	7 3
Colored	49	15	3	7	2	-------	64.5	19.7	13 1	2 6
District of Columbia, 1930–41:										
White	68	98	52	27	31	-------	24.6	35.5	28 6	11 3
Colored	24	30	10	3	2	-------	34.8	43 8	18 8	2.9
Virginia, 1933–41:										
White	407	353	203	113	135	1	33 5	29 1	26 0	11.1
Colored	96	69	37	17	19	-----	41.9	26.2	23 5	8 3
North Carolina, 1935, white	384	255	97	41	38	6	47 1	31 3	16 9	4 7
1939–41	111	33	11	7	18	-----	61.6	18 3	10 0	10 0
Georgia, 1933–41:										
White	524	250	125	59	60	6	51.4	24.5	18 1	5 9
Colored	177	49	23	14	12	2	64 4	17.8	13 3	4 4
Florida, 1939–41:										
White	123	80	62	18	26	10	40 0	25.9	25 7	8 4
Colored	24	11	6	3	------	-------	54 5	25 0	20 4	-----
Kentucky, 1932–41:										
White	709	209	156	68	41	8	55 7	23 5	17 5	3.2
Colored	33	21	12	4	1	1	46.5	29 6	22 5	1 4
Tennessee, 1936–41:										
White	545	262	136	48	42	8	52 7	25.4	17 8	4 1
Colored	72	24	12	8	8	1	58.0	19.3	16 2	6.5
Alabama, 1936–41:										
White	741	257	130	60	61	13	59 3	20 6	15 2	4 9
Colored	152	43	31	11	20	3	59.1	16 7	16 4	7.8
Mississippi, 1937–41:										
White	210	123	54	22	16	1	49 4	28 9	17.8	4.1
Colored	171	69	26	15	14	2	58.0	23 4	13 9	4.7
Louisiana, 1930–41:										
White	343	166	87	25	46	22	51 4	24 9	13.7	5.9
Colored	123	51	33	16	15	5	51 7	21.4	20.5	6 3
Montana, 1931–41	116	156	136	65	120	13	19 6	26.3	33.8	20 2
Idaho, 1939–41	31	21	21	13	22	3	28.7	19.4	31.4	20 4
Wyoming, 1940–41	10	13	7	14	9	1	18 8	24.5	39.6	17.0
Colorado, 1938–41	44	56	10	23	30	1	27 6	35.2	20.8	18.8
New Mexico, 1930–41	155	81	43	12	19	1	50.0	26.1	17.7	6.1
Arizona, 1939–41	34	37	17	8	18	6	29 8	32.5	22 0	15 8
Utah, 1932–41	94	89	63	31	27	5	30.9	29 2	30 9	8 8
Washington, 1930–41	272	441	394	249	236	210	17.1	27.7	40.3	14.8
California, 1930–41	1,913	2,621	1,622	991	2,174	89	20.5	28.1	28.0	23 3
New York City, 1930–41	3,424	2,838	1,157	384	276	13	42.3	35.1	19.0	3 4
Cleveland, 1930–41	253	236	164	72	53	-----	32.5	30 3	30 3	6 8
Chicago, 1930–41	514	588	361	131	143	2	29 6	33.8	28.3	8.2
Detroit, 1930–41	399	578	280	87	78	-------	28.1	40.5	25 8	5.5
Baltimore, 1930–41:										
White	85	100	47	17	23	-------	31.2	36 7	23 4	8.4
Colored	25	9	1	3	------	-------	65.8	23.6	10 6	-----
Louisville, 1933–41:										
White	62	59	28	10	10	10	36.6	34 9	22 4	5.9
Colored	8	12	6	2	------	-------	28.5	42.5	28.5	-----
Birmingham, 1930–41:										
White	56	32	24	10	10	-------	42.4	24.2	25.8	7.6
Colored	38	9	10	2	7	-------	57.6	13.6	18.1	10.6
Los Angeles, 1930–41	646	812	577	375	942	4	19.6	24 6	27.3	28.5
San Francisco, 1931–41	48	89	70	25	50	1	17.0	31.5	33.6	17 7

[1] New York State exclusive of New York City.

continued to be a greater concentration of cases under 5 years of age than in the remainder of New York State.

In epidemics the proportion of cases under 5 years of age and those 5 to 9 years usually increased slightly in most of the States and cities for which data are available. Occasionally, as in Los Angeles in 1934, there was an increase in the percentage of reported cases in the older age groups.

EPIDEMIOLOGY OF POLIOMYELITIS

The epidemiological and experimental studies which have been reported during the period covered by this series of reports (1933–42) have not produced any radical changes in our concept of poliomyelitis nor have they yielded information essential for practical control of the disease. However, these studies have suggested certain revisions in the prevailing opinions regarding the portal of entry of the virus and transmission of the disease in man. It seems rather remarkable that in spite of all the time and effort spent in studies on poliomyelitis during the past 20 years so little new information on the epidemiology of the disease has been produced. One can improve very little on Frost's discussion on the epidemiology of poliomyelitis published in Hygienic Laboratory Bulletin No. 90 in 1913, which except for a few minor revisions could be used to outline the prevailing views on the epidemiology of this disease.

In 1933 it was still the opinion of many investigators that the olfactory tract was a common portal of entry of the virus in human poliomyelitis. Since then numerous examinations of olfactory bulbs from fatal human cases have failed except in a few instances to demonstrate the presence of virus in this organ or to show inflammatory reactions which are common in the experimental disease in monkeys infected intranasally.

Although the presence of virus in the stools of some human cases had been demonstrated many years previously, it was not until 1937 that the gastrointestinal tract was seriously considered as a portal of entry by many investigators. The frequency and ease with which virus could be recovered in relatively large amounts from the stools of paralytic and abortive cases, convalescents, and contacts of the disease soon led many to consider the intestinal tract as the principal portal of entry.

The pharyngeal mucosa is still regarded by many investigators as a common portal of entry, an opinion based in part on the fact that the virus may be recovered from the nasopharyngeal secretions in certain cases and contacts. The concensus of opinion regarding the portal of entry of virus in human poliomyelitis would appear to be somewhat as follows at the present time. Infection seldom occurs by way of the olfactory tract but mainly through mucous membrane of

the pharyngeal or the lower gastrointestinal tract, or both. The relative frequency of these sites as portals of entry is still a matter of dispute and should be considered a subject for further investigation.

Little advance has been made in our knowledge of the manner in which infection is transmitted from person to person. The recovery of virus from sewage as well as from fresh stools suggested to some that poliomyelitis might be water-borne. The marked concentration of cases in the summer time has been suggested as favoring such a hypothesis. Maxcy (*6*) recently summed up the evidence for and against the hypothesis that poliomyelitis may be water-borne, and his conclusion was that "there is at present insufficient evidence to justify the belief that water is a medium which is of practical importance in spread."

The impression that the paralytic case or the occasionally recognized abortive case does not represent the extent of active infection in a family or other aggregations of persons living in close contact with each other has been strengthened by several studies in recent years. It appears that abortive or mild infections which do not result in paralysis are the rule rather than the exception in family and other groups, especially during epidemic periods. Langmuir's (*7*) studies during a recent epidemic in New York State seem to verify this impression as have other studies of outbreaks in institutions.

Neither experimental nor epidemiological investigations have produced any convincing evidence that poliomyelitis is transmitted by an insect vector or that reservoirs of infection are to be found in any lower animals. Armstrong's (*8*) demonstration that the Lansing strain of virus when given intracerebrally to cotton rats could produce typical lesions in these animals and could further be adapted to white mice cannot be interpreted to suggest an animal reservoir.

Laboratory studies on poliomyelitis have revealed the existence of several strains of poliomyelitis virus which show some immunological differences. Serum from some adults living in different parts of the world may neutralize a number of strains of the virus which would seem to indicate a fairly wide distribution of the various strains. Aycock (*9*) suggests that more than one strain may circulate freely in a given outbreak.

Although there have not been developed any practical measures for control of the spread of poliomyelitis or a method for protecting susceptible persons against infection, there has been introduced in the United States in the past few years a new form of therapy which is now generally referred to as the Kenny treatment. It promises much toward relieving many of the crippling effects of the disease.

REFERENCES

(1) Caverly, Chas. S.: Infantile paralysis in Vermont, 1894–1922. State Department of Public Health, Burlington, Vt., 1924.
(2) Dauer, C. C.: Studies on the epidemiology of poliomyelitis. Pub. Health Rep., **53**: 1003–1020 (1938).
——————: Prevalence of poliomyelitis in the United States. Pub. Health Rep., **54**: 857–862 (1939); **55**: 955–961 (1940); **56**: 875–883 (1941); **57**: 710–716 (1942).
(3) Hill, H. W.: Epidemiologic study of anterior poliomyelitis in Minnesota. Transactions of Section on Preventive Medicine and Public Health of the Am. Med. Assoc., 1910. Pp. 305–344.
(4) Frost, W. H.: Epidemiologic studies of acute anterior poliomyelitis. Hygiene Laboratory Bull. No. 90. U. S. Government Printing Office, 1913.
(5) Lavinder, C. H., Freeman, A. W., Frost, W. H.: Epidemiological studies of poliomyelitis in New York City and the northeastern United States during the year 1916. Pub. Health Bull. No. 91. U. S. Government Printing Office, 1918.
(6) Maxcy, K. F.: Hypothetical relationship of water supplies to poliomyelitis. Am. J. Pub. Health, **33**: 41–45 (1943).
(7) Langmuir, A. D.: Carriers and abortive cases in a rural poliomyelitis outbreak. Am. J. Pub. Health, **32**: 275–281 (1942).
(8) Armstrong, Charles: Successful transfer of the Lansing strain of poliomyelitis virus from the cotton rat to the white mouse. Pub. Health Rep., **54**: 2302–2305 (1939).
(9) Aycock, W. L.: Immunity to poliomyelitis. Am. J. Med. Sci., **204**: 455–467 (1942).

LEPTOSPIROSIS IN RATS (*R. NORVEGICUS*) IN AND ABOUT WASHINGTON, D. C.[1]

AN EVALUATION OF THE METHODS USED FOR DIAGNOSIS

By Carl L. Larson, *Passed Assistant Surgeon, United States Public Health Service*

Many surveys of the incidence of leptospirosis among wild rats (*Rattus norvegicus*) have been made, but in only a few instances have these studies been carried out with a view of determining the relative efficiency of the various methods available for the detection of this disease among rats. It is proposed to present evidence regarding the value of certain tests in the diagnosis of leptospirosis among animal reservoirs.

Walch-Sorgdrager (*1*) adequately reviews the results obtained from the majority of surveys which have been made and discusses the methods used. It has been established that the leptospirae are localized in the kidneys during the chronic stage of the disease and that specific antibodies are produced against *Leptospira icterohaemorrhagiae* following infection with this organism. Practical attempts to determine the incidence of infection due to *L. icterohaemorrhagiae* in rats should include serological studies and methods to isolate or visualize the organisms in the kidney of all animals examined. As many as 86 percent of the rats examined during some surveys have been found to be infected, but as a rule about 30 to 40 percent of the

[1] From the Division of Infectious Diseases, National Institute of Health.

rats studied have been infected. Walch and Walch-Sorgdrager (*2*) found that 17, or 33 percent, of 51 rats examined in Baltimore, Md., were harboring *L. icterohaemorrhagiae*. Syverton, Stiles, and Berry (*3*) found 37.3 percent of rats trapped in Rochester, N. Y., infected, and 16.7 percent in Detroit, Mich., and San Francisco, Calif., were also infected. Otteraaen (*4*) found only 1 infected rat in 30 examined in Chicago. Lewis (*5*) noted 11 of 100 rats studied in Philadelphia to be infected. He found inoculation of guinea pigs with an emulsion of rat kidney to be the most efficient method for the detection of leptospiral infections, but he did not use serological tests.

Walch-Sorgdrager gives the experience of Dutch workers concerning the incidence of leptospirosis among young and old specimens of *R. norvegicus*. They found the incidence of infection to be about eight times as great in rats over 20 cm. in length as in rats under that length.

As cases of Weil's disease have occurred in and near Washington, D. C., it was considered of value to determine the extent of infection with *L. icterohaemorrhagiae* existing among rats in this area, as well as to evaluate the methods available and the influence of sex and age upon the incidence of infection.

MATERIALS AND METHODS

Wild rats (*R. norvegicus*) were trapped alive in the area in and about Washington during the period from June 1940 to September 1941. They were caught in private dwellings, stores, a jail, and in two areas used for the dumping and incineration of refuse. Ninety-two rats were obtained and examined by the methods to be described.

Examinations of the animals were started following administration of ether. The length from tip of the nose to base of the tail was measured and recorded. Blood was drawn from the heart under precautions to insure sterility. In order to obtain a maximum amount of serum for serologic study it is essential to withdraw the blood from the heart before the chest wall is opened and the animal expires. The abdomen and thorax were then opened and observations made to determine the sex of the animal and the presence of any abnormalities. The kidneys were removed and placed in a sterile Petri plate. Slices of both kidneys were placed in 10 percent formalin for pathologic study and sections were stained with hematoxylin-eosin and with Levaditi's silver impregnation stains. Finely minced bits of each kidney were dropped into tubes containing 5 cc. of Schuffner's modification of Verwoort's medium and incubated at 32° C. The cut surfaces of both kidneys were scraped with a sterile wire, the scrapings were emulsified in a drop of salt solution on a microscope slide, covered with a cover glass, and examined with dark-field illumination using a magnification of 450. The remainder of the kidney and a roughly equivalent amount of liver were ground in a mortar with alundum and sufficient salt solu-

tion was added to make a 10 percent suspension. This suspension was also examined for the presence of organisms. It was then inoculated into four or five young white mice and two guinea pigs regardless of whether or not organisms were noted. The amounts given by intraperitoneal injection were 0.5 cc. for the mice and 2.0 cc. for the guinea pigs.

The agglutination-lysis test of Schuffner and Mochtar has been adequately described. Titres of 1:100 or above are considered to be of diagnostic significance.

With regard to the primary isolation of *L. icterohaemorrhagiae* in artificial culture medium it may be pointed out that portions of the original culture fluid should be examined microscopically daily for the presence of organisms. Cultures which have been positive on the first or second day after inoculation have subsequently become sterile especially where fairly large amounts of tissue were used for the original inoculum. It has been found that the best results are obtained when subcultures are made from the original culture media about 24 hours after inoculation. Both the original culture and the subculture are then incubated and observed for growth.

Every rat studied was not examined by all the methods described. The kidneys of only 42 rats were subjected to microscopic pathological examination; guinea pig and mouse inoculation with tissue emulsion was practiced in 81 and 74 instances, respectively. The white mice used in these experiments were 3 weeks of age and the guinea pigs weighed about 200 gm.

EXPERIMENTAL

The distribution of sex and the size of the rats are shown in table 1. It will be noted that 54.3 percent of the 92 rats examined were females. Of the males and females, 76.2 percent and 68 percent, respectively, were 20 cm. or over in length. Only 26 rats, or 28.2 percent of the total, were under 20 cm., but the number appears to be sufficient to determine differences in the rate of infection among large and small rats.

TABLE 1.—*Wild rats,* R. norvegicus, *trapped in and about Washington D. C.*

Sex	Number of rats	Size of rats	
		Over 20 cm. in length	Under 20 cm in length
Total	92	66	26
Female	50	34	16
Male	42	32	10

Using all methods available for diagnosis, a considerable variation was found in the rate of infection with *L. icterohaemorrhagiae* among

rats above and below 20 cm. in length. These results are tabulated in table 2. There were 44, or 47.8 percent, of the entire group which gave evidence of infection with *L. icterohaemorrhagiae*. While 60.6 percent of the 66 rats over 20 cm. in length were infected, only 15.4 percent of 26 rats under 20 cm. in length were found to be infected with *L. icterohaemorrhagiae*. There was no significant variation between the percentage of males and females which had findings pointing to infection with this organism. It is to be observed that there is a considerable difference between the rate of infection among the large and small members of either sex. This is especially apparent among the females. Here 73.6 percent of the larger specimens harbored leptospirae, and only 18.8 percent of those under 20 cm. in length were involved. In general, these results are comparable to those obtained by the Dutch workers who found that while 33.4 percent of 919 rats over 20 cm. in length gave evidence of infection, only 4.4 percent of 456 rats under 20 cm. in length showed signs of leptospirosis.

TABLE 2.—*Incidence of infection with* L. icterohaemorrhagiae *in wild rats trapped in and about Washington, D. C.*

Size	Number	Infected with *L. icterohaemorrhagiae*	
		Number	*Percent*
Both sexes:			
All sizes	92	44	47.8
Over 20 cm.	66	40	66.6
Under 20 cm.	26	4	15.4
Female			
All sizes	50	28	56.0
Over 20 cm.	34	25	73.6
Under 20 cm.	16	3	18.8
Male:			
All sizes	42	16	38.1
Over 20 cm.	32	15	46.9
Under 20 cm.	10	1	10.0

Table 3 summarizes the results obtained by the various methods of diagnosis employed in the study. Agglutination tests performed on serum yielded the best results. The observed agglutination titres varied from 1 to 100, to 1 to 10,000. Only one animal which was found positive on any other test failed to give a positive reaction when its serum was tested for the presence of agglutinins against *L. icterohaemorrhagiae*. In this instance organisms were detected in the kidney when stained by Levaditi's method, but not noted by any of the other methods. In every rat in which agglutinins were demonstrated further evidence of the presence of *L. icterohaemorrhagiae* was also obtained.

Among 42 rats, the kidneys of which had been examined microscopically after having been stained by Levaditi's method, 19, or 45.2 percent, were found to harbor leptospirae. In three cases where other

methods of examination gave evidence of the presence of leptospirae, the organisms were not demonstrable in stained sections of the kidney.

Dark-field examination of smears from kidneys of 92 rats showed 37, or 40.2 percent, to be harboring leptospirae, but this method failed to detect these organisms in seven cases where other types of positive evidence were obtained.

TABLE 3.—*Results obtained from various methods of testing wild rats for evidence of infection with* L. icterohaemorrhagiae

Sex	Agglutination-lysis test		Dark-field examination		Cultural methods		Stained sections		Inoculation of mice		Inoculation of guinea pigs	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Over 20 cm.:	*No.*	*No.*	*No*	*No*	*No.*	*No*	*No*	*No*	*No*	*No*	*No*	*No*
Male	14	18	14	18	11	21	2	4	9	19	4	19
Female	25	9	19	15	18	16	14	5	13	13	10	24
Under 20 cm:												
Male	1	9	1	9	1	9	0	7	1	5	0	8
Female	3	13	3	13	1	15	3	7	3	11	3	13
Total	43	49	37	55	31	61	19	23	26	48	17	64
Percent positive	46.7		40 2		33 7		45 2		35.1		20.9	

Cultures yielded *L. icterohaemorrhagiae* from 31, or 33.7 percent, of the rats and were deficient in 13 instances.

Groups of young white mice were inoculated intraperitoneally with tissue emulsion from 74 rats and of these attempts to isolate the organism, 26, or 35.1 percent, gave positive results and in 9 instances this method failed when other tests indicated the presence of the organism. Inoculation of comparable material from 81 rats injected into pairs of guinea pigs resulted in the isolation of the organism from 19, or 20.9 percent, of the rats tested, and in failure to isolate the organism from 21 rats which were found to be positive by some other test.

TABLE 4.—*Comparison of methods for the diagnosis of leptospirosis in a series of 27 rats in which all tests were performed*

Test	Rats having negative reaction	Rats having positive reaction	
	Number	*Number*	*Percent*
Agglutination-lysis	12	15	55.5
Dark-field	16	11	40.7
Culture	18	9	33.3
Stained sections	15	12	44.4
Inoculation of mice	17	10	37.0
Inoculation of guinea pigs	17	10	37 0

In a series of 27 rats, upon which all tests were performed, results roughly comparable to those cited above were obtained. The results are given in table 4. There were 15, or 55.5 percent, positive in

this group when all tests were used. The presence of agglutinins was demonstrated in each of the 15 rats and in no case were these detected when some other method of diagnosis did not also yield positive results. It is evident that serologic tests result in a greater proportion of positive results than can be obtained by any other single method, and it appears that the results obtained from this test are reliable.

DISCUSSION

The results obtained from this study demonstrate the value of using multiple methods for determination of the extent of infection with *L. icterohaemorrhagiae* among rodent populations. No single method of specific diagnosis is infallible, but each serves to substantiate the other methods. The most reliable method was the agglutination test. In only 1 of 44 animals infected with *L. icterohaemorrhagiae* were agglutinins absent. Studies of sections of kidney stained by Levaditi's silver impregnation method and of emulsions made from fresh kidney examined by dark-field illumination yielded the next greatest number of positive results. Cultures and inoculation of young mice or guinea pigs with kidney emulsions from rats were of least value. For practical purposes, from the standpoint of expense, effort, and time, the agglutination test may be recommended as the method of choice for surveys designed to determine the incidence of leptospirosis among rodent hosts.

The difference in the number of infections among the young and old members of either sex is remarkable. The influence of sex and age of rats examined during the course of a survey is apparent and due note should be made of these in interpreting results.

CONCLUSIONS

Wild rats (*R. norvegicus*) trapped in and about Washington, D. C., were found to be infected with *L. icterohaemorrhagiae.*

A greater incidence of infection was noted among specimens over 20 cm. in length than among those of smaller size.

The most reliable methods for the detection of leptospirosis among rats were serologic examinations of serum and study of Levaditi-stained sections of kidney.

It is recommended that the agglutination test be used whenever surveys of the incidence of murine leptospirosis are made.

REFERENCES

(*1*) Walch-Sorgdrager, B.: Leptospiroses. Bulletin of the Health Organization, League of Nations, 8:143-386 (1939).

(*2*) Walch, E. W., and Walch-Sorgdrager, B.: Observations on *Leptospira icterohaemorrhagiae* in the wild rats in Baltimore. Am. J. Hyg., 7:393-406 (1927).

(3) Syverton, J. T., Stiles, W. W., and Berry, G. P.: Epidemiological studies on Weil's disease, with notes on the susceptibility of the "gopher" *Citellus richardsonii* (Sabine) to the experimental inoculation of *Leptospira icterohaemorrhagiae*. Scientific Proceedings Soc. Am. Bact. Abstracts. J. Bact., 36:279 (1938).
(4) Otteraen, A.: The spirochete of infectious jaundice (*Spirocheta icterohemorrhagiae* Inada, *Leptospira Noguchi*) in house rats in Chicago. J. Inf. Dis., 24:485–488 (1919).
(5) Lewis, M.: Incidence of *Leptospira icterohaemorrhagiae* in trapped rats in Philadelphia. Am. J. Trop. Med., 22:571–576 (1942).

THE EFFECT OF ARSENATES ON THE STORAGE OF LEAD [1]

By Lawrence T. Fairhall, *Principal Industrial Toxicologist*, John W. Miller, *Surgeon (R)*, and F. Lloyd Weaver, *Assistant Scientific Aide*,[2] *United States Public Health Service*

In a preceding study of the toxicity of lead arsenate (*1*) it was found that less lead was stored in animals receiving lead arsenate by oral administration than in animals similarly receiving an equivalent amount of lead as lead carbonate. It is not likely that this is due to the insolubility of lead arsenate—that it passes through the gastrointestinal tract unchanged—since experiments in man have shown that it is broken down in the alimentary canal with practically complete absorption of the arsenic which is later excreted by the kidneys (*2*). It would appear, therefore, that the arsenate group either decreases the absorption or increases the excretion of absorbed lead, so that storage is markedly reduced. However, lead arsenate was shown to be more toxic ultimately in the quantities fed (10 mg. of lead arsenate per rat per day) than equivalent amounts of lead carbonate.

The recent investigation of Moxon and Dubois (*3*) has shown that rats fed a diet 11 p. p. m. of selenium from seleniferous wheat are completely protected against selenium poisoning when they were given 5 p. p. m. of arsenic as sodium arsenite in the drinking water. It is somewhat difficult to hypothesize the mechanism of this protective action, but it is of interest that arsenic in the trivalent form in one case and in the pentavalent form in the other tends to diminish the toxicity of selenium and the retention of lead, respectively.

Further investigation has been made to find whether a soluble arsenate such as sodium arsenate fed with lead carbonate would have an effect similar to that of lead arsenate.

In this experiment a group of 145 rats was given a basic diet containing 1,230 p. p. m. of lead carbonate; a second group of 142 rats received food containing 1,230 p. p. m. of lead carbonate and 930 p. p. m. of sodium arsenate; a third group of 51 rats was given food

---

[1] From the Division of Industrial Hygiene, National Institute of Health.
[2] At present, Ensign, U. S. N. R.

containing 930 p. p. m. of sodium arsenate alone, and a fourth group of 46 rats on the basic diet alone served as controls.

The animals were kept under experiment for 20 weeks and were then sacrificed. Tissues were removed for chemical analysis and microscopical examination. The primary purpose of this experiment was to determine whether the storage of lead was similar to that with lead arsenate feeding. At the end of 1 year the average amount of lead stored in the bone tissue of rats fed lead arsenate was found to be decidedly less than that found when the animals were fed lead carbonate alone.

While the growth curves of the various groups show no abnormality, growth was retarded most in the sodium arsenate group, less in the lead carbonate-sodium arsenate group, and still less in the lead carbonate group.

Table 1 summarizes the analytical values for the lead and arsenic content of the various tissues of the animals in each group. Each animal was autopsied, the liver, kidneys, and bones weighed and sampled for chemical analysis, and the tissues individually analyzed. Group values rather than individual values are given owing to the large number of animals used.

TABLE 1.—*The effect of sodium arsenate on the storage of lead*

Group	Lead carbonate		Lead carbonate-sodium arsenate			Sodium arsenate	Controls		
	Mg Pb/10 gm.		Mg. Pb/10 gm.		Mg As/10 gm.	Mg. As/10 gm.	Mg. Pb/10 gm.		Mg. As/10 gm.
	Kidney	Bone	Kidney	Bone	Kidney	Kidney	Kidney	Bone	Kidney
A	0 505	4 69	0 283	2 47	0 104	0 153	0 000	0.006	0 009
B	.553	4 11	.207	2 28	.126	.266	.001	.017	.006
C	.350	4.19	.263	3 76	063	.321	.001	.012	.004
D	.463	4 51	.200	3 08	.121	.125	.000	.016	.005
E	.291	3.69	.301	2 81	.135	.150	.000	.017	.008
F	.383	4.86	.351	2 24	.145	.265	.000	.013	.007
G	.369	4 50	.329	3 50	.118	.182	.000	.011	.003
H	.466	4 96	.459	2.95	.103	.139	.000	.008	.000
I	.586	4.51	.257	2 36	.129	-------	-------	-------	-------
J	.449	5 63	.391	2 32	.153	-------	-------	-------	-------
K	.583	5 63	.347	3.17	.136	-------	-------	-------	-------
L	.426	5 24	.347	3.60	.099	-------	-------	-------	-------
M	.386	4 55	.330	2 84	.090	-------	-------	-------	-------
N	.408	3.76	.209	3.73	.128	-------	-------	-------	-------
O	.535	4 23	.259	2 33	.082	-------	-------	-------	-------
P	.624	4.89	.304	2.13	.102	-------	-------	-------	-------
Q	.401	5.46	.280	3.22	.056	-------	-------	-------	-------
R	.377	3.85	.281	3.79	075	-------	-------	-------	-------
S	.460	4.20	.135	3.28	.082	-------	-------	-------	-------
T	.419	5 41	.182	2.56	.073	-------	-------	-------	-------
U	.670	4.99	.256	2 56	082	-------	-------	-------	-------
Average	.462	4.65	.289	2 90	.105	.200	-------	.008	.005

The concentration of arsenic in the kidneys was greater in the animals fed sodium arsenate than in those fed both lead carbonate and sodium arsenate. The proportion was nearly 2:1 (0.200:0.105). Since all the animals received identical amounts of sodium arsenate,

it would appear that administration of lead carbonate with sodium arsenate definitely affected the concentration of arsenic in the kidneys. The normal arsenic content of the kidneys of the control animals was negligible.

It is of interest to note that the concentration of lead in the kidneys was greater in those animals given lead carbonate than in those receiving lead carbonate and sodium arsenate. The latter amounted to only 62.3 percent of the former.

Despite the differences between the two groups with respect to the concentration of lead in the kidneys, the ratio of kidney lead to bone lead is as 1:10 in each group.

More significant than the storage of lead in the kidneys is its storage in bone tissue. Here the disparity is marked and is of greater significance because of the quantity stored. In the case of the animals fed lead carbonate the average amount of lead stored was 4.65 mg. of lead as Pb per 10 gm. of bone, while the average storage in the animals given lead carbonate-sodium arsenate was 2.90 mg. of lead as Pb per 10 gm. of bone, or 62.3 percent of the former. This compares well with the difference in bone storage noted with lead carbonate and lead arsenate feeding 3.99 and 2.49 mg./10 g. bone, respectively, or 60.0 percent (*1*).

It would thus appear from these two independent studies that arsenates definitely diminish the storage of lead in bone tissue.

PATHOLOGY

Tissue from a random number of animals in each of the groups fed sodium arsenate, lead carbonate, and sodium arsenate-lead carbonate mixture was submitted to histopathologic examination. Paraffin sections were made from the liver, spleen, kidneys, adrenals, heart, pancreas, stomach, duodenum, jejunum, ileum, large intestine, and mesenteric lymph nodes. The sections were stained routinely by Lillie's eosin-polychrome methylene blue method (*4*). Kidneys and spleens were stained by ferrocyanide to demonstrate the presence or absence of iron-bearing pigment. A number of kidney sections were stained with eosin as a check for the detection of oxyphil intranuclear inclusions. A total of 1,935 sections from 118 rats was examined.

Kidneys.—Oxyphil intranuclear inclusions in the cells of the convoluted tubules were present in all of the animals fed lead carbonate They were occasionally seen in the animals fed the lead carbonate-sodium arsenate mixture and were absent in all of the animals receiving sodium arsenate. Brown intracellular pigment particles observed in other experiments (*1*) in which the animals were fed lead carbonate were also noted n this experiment. They were most marked in the rats fed lead carbonate; were present to a lesser extent both

in quantity and in numbers of animals fed the mixture, and were infrequently observed in the animals receiving sodium arsenate Their presence in this same degree with reference to the materials administered occurred in the proximal convoluted tubules as compared with the distal convoluted tubules. Cells of the convoluted tubules were swollen and contained large vesicular nuclei. The frequency of this finding followed the same relative order of the substances fed the animals. A similar degree of all other renal changes was observed in this same order. All of the kidneys, regardless of compound, failed to show the presence of an iron-bearing pigment. No casts of any significance were noted. Subacute interstitial nephritis was noted in an inconsequential number of animals and appeared to have no reference to the lead or arsenic compounds.

Spleen.—No great variation was noted in the size and appearance of the splenic corpuscles in the three groups of animals. They varied from large to small in size and were generally well defined. The cavernous veins were usually filled with blood and, as in previous experiments, the degree of relative perifollicular anemia, characterized by zones of pale staining cells, varied inversely with the amount of blood in the cavernous veins. Diffuse iron reactions of cells of the pulp were most marked in the animals fed sodium arsenate, less in those given the sodium arsenate-lead carbonate mixture, and least in the animals fed lead carbonate. This hemosiderosis, however, was present to some degree in all of the animals exposed to these compounds. Splenic myelosis followed the same order, being least in the animals fed lead carbonate.

This is consistent with a previous finding in rats fed lead carbonate for 1 and 2 years. Follicular phagocytosis, characterized by the presence of nuclear fragments in the follicles, appeared of no significance. Lymphocytic infiltration of the trabeculae, while present, also appeared of no importance.

Liver.—A slight periportal lymphocytic infiltration was noted in about half the rats receiving sodium arsenate but was absent in those receiving the lead carbonate-sodium arsenate mixture. Large nuclei were occasionally seen in the liver cells in the animals fed lead carbonate but appeared to be of no significance because of infrequency. No oxyphil intranuclear inclusions such as those described by Blackman (*5*) were noted.

No changes of note were observed in the other organs examined.

SUMMARY

A soluble arsenate, such as sodium arsenate, when fed to rats receiving lead carbonate, was shown to produce effects similar to those produced by lead arsenate alone. The administration of sodium arsenate with lead carbonate diminished the concentration of lead in

the kidneys, while the concentration of arsenic amounted to only half that of the sodium arsenate group. More significant is the fact that arsenates in general definitely diminish the storage of lead in bone tissue.

The amount of pathologic damage follows that observed in experiments previously described in which lead arsenate and lead carbonate were fed to animals for comparison of the relative toxicity of molecular components. In this study the spleen showed the most marked changes with sodium arsenate and the least with lead carbonate. Conversely the kidney showed more marked changes with lead carbonate. The tissues from the animals receiving both sodium arsenate and lead carbonate showed changes of an intermediate degree. No pathologic changes of any significance were observed in the liver.

REFERENCES

(*1*) Fairhall, L. T., and Miller, J. W.: A study of the relative toxicity of the molecular components of lead arsenate. Pub. Health Rep., **56**: 1610–1625 (1941).

(*2*) Fairhall, L. T., and Neal, P. A.: The absorption and excretion of lead arsenate in man. Pub. Health Rep., **53**: 1231–1245 (1938).

(*3*) Moxon, A. L., and DuBois, K. P.: The influence of arsenic and certain other elements on the toxicity of seleniferous grains. J. Nutrit., **18**: 447–457 (1939).

(*4*) Lillie, R. D.: Romanowsky staining with buffered solutions. III. Extension of the method to Romanowsky stains in general. Stain Technol., **16**: 1–6 (1941).

(*5*) Blackman, S. S.: Intranuclear inclusion bodies in the kidney and liver caused by lead poisoning. Bull. Johns Hopkins Hosp., **58**: 384–403 (1936).

DEATHS DURING WEEK ENDED JUNE 5, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended June 5, 1943	Corresponding week, 1942
Data for 89 large cities of the United States:		
Total deaths	8,870	8,192
Average for 3 prior years	8,302	
Total deaths, first 22 weeks of year	215,063	195,001
Deaths under 1 year of age	641	552
Average for 3 prior years	520	
Deaths under 1 year of age, first 22 weeks of year	14,853	12,434
Data from industrial insurance companies:		
Policies in force	65,548,808	64,984,131
Number of death claims	10,286	10,588
Death claims per 1,000 policies in force, annual rate	8.2	8.5
Death claims per 1,000 policies, first 22 weeks of year, annual rate	10.4	9.9

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JUNE 12, 1943

Summary

As compared with the preceding week's totals, slight increases are shown in the incidence of all of the nine common communicable diseases included in the following table except influenza, meningococcus meningitis, and scarlet fever, and totals of five of these nine diseases (influenza, measles, meningococcus meningitis, poliomyelitis, and whooping cough) exceed the corresponding 5-year (1938–42) medians. Cumulative totals for the first 23 weeks of the year are also above the corresponding medians for measles, meningococcus meningitis, poliomyelitis, and whooping cough.

A sharp decline was recorded for meningococcus meningitis. A total of 382 cases was reported for the week, as compared with 439 for the preceding week and a 5-year median of 32.

A total of 60 cases of poliomyelitis was reported, as compared with 52 for the preceding week, 27 for the next earlier week, and a 5-year median of 29. Of the current total, 27 cases occurred in California and 10 in Texas. Of 658 cases reported to date this year, California has reported 188 cases, Texas 92, and Arizona 36.

Approximately one half of the current cases of scarlet fever were reported in the Middle Atlantic and East North Central States; of the current total for measles, nearly 80 percent were reported in the New England, Middle Atlantic, and East North Central areas; and of the current influenza cases approximately 40 percent occurred in Texas.

The incidence of typhoid fever continues low. A total of 109 cases was reported currently (less than the number reported for the corresponding week of any prior year), as compared with 80 cases for the preceding week and a 5-year median of 130.

Deaths registered in 88 large cities of the United States for the current week totaled 9,074, as compared with 8,844 for the preceding week and a 3-year (1940–42) average of 7,951. The accumulated number for the first 23 weeks of the year is 223,507, as compared with 202,603 for the corresponding period of 1942.

Telegraphic morbidity reports from State health officers for the week ended June 12, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42
	June 12, 1943	June 13, 1942		June 12, 1943	June 13, 1942		June 12, 1943	June 13, 1942		June 12, 1943	June 13, 1942	
NEW ENGLAND												
Maine	0	0	0	2	---	---	191	113	113	5	4	0
New Hampshire	0	0	0	---	---	---	36	5	10	2	1	0
Vermont	0	0	0	---	---	---	293	163	96	0	0	0
Massachusetts	2	7	3	---	---	---	1,532	856	1,078	19	2	2
Rhode Island	0	0	0	---	---	---	81	170	106	6	0	0
Connecticut	2	0	0	---	2	2	342	324	324	8	0	0
MIDDLE ATLANTIC												
New York	8	8	22	[1] 2	[1] 3	[1] 7	3,784	1,268	1,856	63	19	4
New Jersey	4	5	10	7	---	2	2,172	568	568	23	2	1
Pennsylvania	15	14	14	---	---	---	1,007	715	715	27	5	6
EAST NORTH CENTRAL												
Ohio	7	2	13	2	3	7	315	361	361	15	1	1
Indiana	3	2	4	1	3	3	372	73	73	5	1	1
Illinois	23	19	26	5	44	11	1,432	222	222	19	1	1
Michigan [2]	5	1	4	1	4	1	3,352	461	832	28	1	1
Wisconsin	1	0	0	13	21	20	2,497	1,207	1,219	3	1	0
WEST NORTH CENTRAL												
Minnesota	1	1	1	1	---	1	377	309	166	3	0	0
Iowa	5	3	3	---	---	---	97	235	177	0	0	0
Missouri	0	0	3	---	3	1	185	496	98	14	3	0
North Dakota	0	1	1	2	2	7	51	19	19	1	0	0
South Dakota	0	1	1	---	---	---	79	7	7	0	0	0
Nebraska	2	0	1	1	2	---	158	89	89	2	0	0
Kansas	2	4	2	---	3	2	287	177	257	7	1	0
SOUTH ATLANTIC												
Delaware	0	0	0	---	---	---	30	7	7	0	0	0
Maryland [2]	6	4	1	1	---	2	226	178	178	13	12	1
District of Columbia	0	1	1	1	---	---	89	42	42	7	1	0
Virginia	1	2	6	60	86	86	219	83	339	5	0	1
West Virginia	3	2	6	1	---	4	33	25	26	6	0	1
North Carolina	4	5	7	2	5	1	167	262	296	6	2	0
South Carolina	8	0	2	79	89	89	77	60	60	4	0	1
Georgia	1	3	3	17	6	8	97	33	148	4	0	0
Florida	0	5	5	4	2	2	18	71	71	3	0	0
EAST SOUTH CENTRAL												
Kentucky	2	4	6	2	3	5	63	33	144	1	3	1
Tennessee	7	3	3	11	16	16	103	77	107	10	2	1
Alabama	2	1	5	35	18	16	110	26	80	1	2	2
Mississippi [2]	2	2	6	---	---	---	---	---	---	3	0	0
WEST SOUTH CENTRAL												
Arkansas	7	4	4	6	12	11	55	68	68	[3] 0	0	0
Louisiana	1	6	6	---	2	7	17	70	18	0	2	1
Oklahoma	4	2	2	9	23	16	13	38	117	0	0	1
Texas	29	11	16	298	145	153	228	225	437	9	2	2
MOUNTAIN												
Montana	0	1	1	4	---	---	110	148	97	3	0	0
Idaho	0	0	0	---	---	---	29	54	23	9	0	0
Wyoming	0	0	0	19	13	---	41	15	15	3	0	0
Colorado	13	9	8	56	22	4	151	166	145	2	0	0
New Mexico	0	5	1	6	2	1	3	12	38	1	0	0
Arizona	2	0	3	58	23	43	9	64	39	2	0	0
Utah [2]	0	0	0	---	---	---	112	634	363	3	0	0
Nevada	0	0	---	---	---	---	17	25	---	1	0	---
PACIFIC												
Washington	9	3	2	7	1	---	361	992	263	8	1	0
Oregon	2	0	1	10	9	9	105	49	69	6	2	0
California	17	13	16	42	49	49	1,163	3,367	871	22	4	2
Total	200	154	222	765	616	731	22,286	14,662	14,662	[3] 382	75	32
23 weeks	5,671	5,897	7,254	75,514	76,675	147,990	466,940	423,156	423,156	11,104	1,791	1,094

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended June 12, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42	Week ended		Median 1938–42
	June 12, 1943	June 13, 1942		June 12, 1943	June 13, 1942		June 12, 1943	June 13, 1942		June 12, 1943	June 13, 1942	
NEW ENGLAND												
Maine	0	1	0	13	3	3	0	0	0	0	0	0
New Hampshire	1	0	0	9	9	1	0	0	0	0	0	0
Vermont	0	0	0	9	5	5	0	0	0	0	0	0
Massachusetts	0	0	0	360	197	166	0	0	0	4	4	1
Rhode Island	1	0	0	24	2	6	0	0	0	0	1	0
Connecticut	1	1	0	64	18	35	0	0	0	3	0	2
MIDDLE ATLANTIC												
New York	5	2	2	344	239	411	0	0	0	7	5	7
New Jersey	0	0	0	52	83	102	1	0	0	3	2	1
Pennsylvania	0	0	0	130	210	256	0	0	0	5	10	7
EAST NORTH CENTRAL												
Ohio	1	0	0	134	196	196	3	1	1	4	3	6
Indiana	1	0	0	54	20	34	1	0	2	5	0	1
Illinois	1	3	2	108	75	202	0	1	12	1	2	4
Michigan [2]	0	0	0	66	178	255	0	0	2	2	4	3
Wisconsin	0	0	0	237	93	93	0	0	1	1	2	1
WEST NORTH CENTRAL												
Minnesota	0	1	0	38	24	43	0	0	3	0	0	0
Iowa	0	1	0	12	14	37	0	0	0	0	1	0
Missouri	0	0	0	37	132	55	1	0	6	2	1	2
North Dakota	0	0	0	0	6	5	0	0	0	0	0	1
South Dakota	0	1	0	12	8	7	0	0	5	1	0	0
Nebraska	0	0	0	17	6	8	0	0	1	0	0	0
Kansas	0	0	0	24	17	29	0	0	0	2	1	1
SOUTH ATLANTIC												
Delaware	0	0	0	3	7	6	0	0	0	0	0	0
Maryland [2]	0	0	0	34	39	36	0	0	0	3	3	2
District of Columbia	0	0	0	6	6	6	0	0	0	0	1	0
Virginia	0	1	0	20	17	17	0	0	0	7	3	5
West Virginia	0	0	0	10	9	18	0	0	0	3	3	3
North Carolina	0	0	0	7	17	16	0	0	0	0	10	10
South Carolina	0	1	1	4	1	3	0	0	0	1	1	4
Georgia	0	0	0	11	4	5	0	0	0	15	13	13
Florida	0	1	1	0	1	3	0	0	0	7	4	5
EAST SOUTH CENTRAL												
Kentucky	2	0	0	10	35	35	0	0	1	4	2	9
Tennessee	0	1	0	10	24	26	0	0	2	3	6	4
Alabama	2	1	1	11	4	8	0	0	1	0	1	3
Mississippi [2]	0	1	1	3	3	2	0	1	1	2	2	2
WEST SOUTH CENTRAL												
Arkansas	1	1	0	5	5	2	1	2	2	7	1	7
Louisiana	0	3	1	2	4	6	1	0	0	5	4	6
Oklahoma	0	0	0	13	4	5	0	0	5	1	4	4
Texas	10	1	1	26	12	21	0	1	3	6	17	16
MOUNTAIN												
Montana	0	0	0	8	4	10	0	0	0	0	0	0
Idaho	0	0	0	66	2	2	0	0	1	0	0	0
Wyoming	0	0	0	17	5	2	0	0	0	0	0	0
Colorado	0	0	0	45	11	21	0	0	4	0	1	1
New Mexico	0	0	0	3	2	7	0	0	0	1	1	2
Arizona	3	0	0	11	0	3	0	0	0	0	0	1
Utah [2]	0	0	0	19	2	7	0	0	0	0	0	0
Nevada	1	0	------	1	0	------	0	0	------	0	0	------
PACIFIC												
Washington	3	0	0	20	16	19	0	0	1	0	0	2
Oregon	0	2	0	12	5	11	1	1	1	1	0	0
California	27	0	4	173	85	111	0	0	1	3	3	9
Total	60	23	29	2,294	1,859	2,338	9	7	62	109	116	130
23 weeks	658	476	532	87,636	80,809	106,053	553	514	1,607	1,425	1,939	2,088

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended June 12, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Whooping cough, Week ended June 12, 1943	Whooping cough, Week ended June 13, 1942	Whooping cough, Median 1938–42	Week ended June 12, 1943: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt spotted fever	Tularemia	Typhus fever
NEW ENGLAND												
Maine	32	65	24	0	0	0	0	0	0	0	0	0
New Hampshire	15	2	2	0	0	0	0	0	0	0	0	0
Vermont	7	50	34	0	0	0	0	0	0	0	0	0
Massachusetts	132	187	162	0	0	0	0	0	0	0	0	0
Rhode Island	37	32	27	0	0	0	0	0	0	0	0	0
Connecticut	24	86	86	0	0	2	0	1	0	0	0	0
MIDDLE ATLANTIC												
New York	241	368	368	1	3	16	0	0	0	0	0	0
New Jersey	167	432	197	0	3	0	0	0	0	0	0	0
Pennsylvania	237	215	302	0	0	0	0	3	0	0	0	0
EAST NORTH CENTRAL												
Ohio	125	196	145	0	0	0	0	1	0	1	0	0
Indiana	57	34	35	0	0	0	0	0	0	0	0	0
Illinois	132	275	232	0	3	1	0	3	0	1	2	0
Michigan [2]	219	218	218	0	1	3	0	0	0	0	0	0
Wisconsin	246	206	125	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	51	20	29	0	4	0	0	0	0	0	0	0
Iowa	23	29	29	0	0	0	0	0	0	0	0	0
Missouri	34	20	19	0	0	0	0	0	0	1	0	0
North Dakota	11	8	15	0	0	0	0	0	0	0	0	0
South Dakota	0	4	4	0	0	0	0	0	0	0	0	0
Nebraska	9	16	16	0	0	0	0	0	0	0	0	0
Kansas	75	55	55	0	0	0	0	1	0	0	2	0
SOUTH ATLANTIC												
Delaware	4	1	3	0	0	0	0	0	0	2	0	0
Maryland [2]	121	34	46	0	0	0	0	1	0	2	0	0
District of Columbia	41	24	11	0	1	0	0	0	0	0	0	0
Virginia	135	41	59	0	0	0	63	0	0	3	0	0
West Virginia	129	17	58	0	0	0	0	0	0	0	0	0
North Carolina	250	160	237	0	0	0	0	0	0	1	0	0
South Carolina	84	50	63	0	0	0	0	0	0	0	1	0
Georgia	90	14	25	0	0	12	1	1	0	1	2	14
Florida	21	10	10	0	0	0	0	0	0	0	0	5
EAST SOUTH CENTRAL												
Kentucky	55	80	80	0	0	0	0	0	0	0	0	0
Tennessee	69	67	54	0	0	0	4	1	0	0	1	0
Alabama	39	71	71	0	0	0	0	1	0	0	0	1
Mississippi [2]	------	------	------	0	0	0	0	0	0	0	2	0
WEST SOUTH CENTRAL												
Arkansas	47	42	39	0	0	1	0	0	0	0	10	0
Louisiana	7	12	12	0	0	3	0	0	0	0	0	1
Oklahoma	26	9	12	0	0	0	0	0	0	0	0	0
Texas	507	138	294	0	74	231	0	0	0	1	0	22
MOUNTAIN												
Montana	20	18	7	0	0	0	0	0	0	4	8	0
Idaho	0	1	4	0	0	0	0	0	0	0	0	0
Wyoming	0	7	6	0	0	0	0	0	0	3	0	0
Colorado	25	29	32	0	1	1	0	0	0	2	0	0
New Mexico	5	20	20	0	0	1	0	0	0	0	0	0
Arizona	23	10	17	0	0	0	30	0	0	0	0	0
Utah [3]	65	42	62	0	0	0	0	1	0	0	0	0
Nevada	2	6	------	0	1	0	0	0	0	0	0	0
PACIFIC												
Washington	60	67	67	0	0	0	0	0	0	0	0	0
Oregon	20	16	27	0	0	0	0	0	0	0	0	0
California	518	274	423	0	1	7	0	0	0	0	0	1
Total	4,240	3,778	3,778	1	92	278	98	14	0	22	28	44
23 weeks	93,259	88,081	90,631	31	769	4,890	1,237	258	11	108	415	1,061
23 weeks, 1942	------	------	------	35	407	2,034	1,181	201	30	148	427	826

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Exclusive of delayed report of 2 cases in Arkansas for the week ended June 5.

WEEKLY REPORTS FROM CITIES

City reports for week ended May 29, 1943

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
NEW ENGLAND												
New Hampshire:												
Concord	0	0	------	0	1	0	0	0	2	0	0	0
Vermont:												
Barre	0	0	------	0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	0	0	------	0	248	5	10	0	175	0	0	24
Fall River	0	0	------	1	99	1	0	0	0	0	0	7
Springfield	0	0	------	0	14	1	2	0	38	0	0	0
Worcester	0	0	------	0	36	0	3	0	12	0	0	0
Rhode Island:												
Providence	0	0	------	0	41	6	4	0	20	0	0	12
Connecticut:												
Bridgeport	0	0	------	0	6	4	0	0	6	0	0	0
Hartford	1	0	1	0	26	0	2	0	0	0	1	1
New Haven	0	0	1	0	15	0	0	0	0	0	0	3
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	0	77	4	10	0	8	0	0	10
New York	13	5	10	1	1601	60	66	0	261	0	0	80
Rochester	0	0	------	0	158	2	5	0	5	0	0	4
Syracuse	0	0	------	0	67	4	3	0	2	0	1	11
New Jersey:												
Camden	0	0	------	0	10	0	2	0	5	0	0	0
Newark	0	0	4	1	311	5	2	0	9	0	0	39
Trenton	0	0	------	0	24	0	4	0	3	0	0	0
Pennsylvania:												
Philadelphia	3	0	1	0	252	8	26	0	98	0	1	53
Pittsburgh	1	0	1	1	30	9	9	0	7	0	1	41
Reading	0	0	------	0	43	0	1	0	1	0	0	10
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	1	0	48	0	3	0	20	0	0	9
Cleveland	4	0	7	2	33	3	9	0	40	0	0	43
Columbus	0	0	------	0	55	1	3	0	10	0	0	0
Indiana:												
Fort Wayne	0	0	------	0	20	0	2	0	1	0	0	0
Indianapolis	0	0	------	2	181	3	5	0	30	0	0	19
South Bend	0	0	------	0	5	0	0	0	0	0	0	0
Illinois:												
Chicago	27	0	2	2	671	13	30	0	87	0	0	67
Springfield	0	0	------	0	47	0	3	0	0	0	0	1
Michigan:												
Detroit	3	1	------	0	1,605	19	7	0	39	0	0	93
Flint	0	0	------	0	266	0	0	0	2	0	0	13
Grand Rapids	0	0	------	0	95	1	2	0	10	0	0	11
Wisconsin:												
Kenosha	0	0	------	0	2	0	0	0	5	0	0	5
Milwaukee	0	0	------	0	553	0	5	0	152	0	0	39
Racine	0	0	------	0	6	0	0	0	14	0	0	1
Superior	0	0	------	0	40	0	0	0	1	0	0	0

City reports for week ended May 29, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	1	21	0	3	0	0	0	0	9
Minneapolis	0	0	------	0	422	2	4	0	14	0	0	14
St. Paul	0	0	------	0	24	0	3	0	4	0	0	41
Missouri:												
Kansas City	1	0	------	0	80	0	8	0	32	0	0	2
St. Joseph	0	0	------	0	15	1	2	0	0	0	0	0
St. Louis	1	0	------	1	60	11	11	0	9	0	0	7
North Dakota:												
Fargo	0	0	------	0	3	0	1	0	0	0	0	0
Nebraska:												
Omaha	1	0	------	0	5	0	7	0	5	0	0	0
Kansas:												
Topeka	0	0	------	0	58	0	1	0	0	0	0	21
Wichita	0	0	------	0	5	0	3	0	0	0	0	11
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	21	2	2	0	1	0	0	0
Maryland:												
Baltimore	3	0	2	2	150	8	11	0	30	0	2	109
Cumberland	0	0	------	0	0	0	0	0	0	0	0	0
Frederick	0	0	------	0	1	0	0	0	1	0	0	0
Dist. of Col.:												
Washington	0	0	1	0	92	10	11	0	12	0	3	30
Virginia:												
Lynchburg	0	0	------	0	0	0	0	0	0	0	0	7
Richmond	0	0	------	0	22	2	2	0	6	0	0	15
Roanoke	0	0	------	0	1	0	0	0	0	0	1	[illegible]
West Virginia:												
Charleston	0	0	------	0	0	0	0	0	1	0	0	[illegible]
Wheeling	0	0	------	0	1	0	1	0	1	0	0	[illegible]
North Carolina:												
Wilmington	0	0	------	0	6	0	1	0	0	0	0	[illegible]
Winston-Salem	0	0	------	0	2	0	6	0	0	0	4	[illegible]
South Carolina:												
Charleston	0	0	------	0	2	0	0	0	0	0	0	[illegible]
Georgia:												
Atlanta	0	0	------	0	0	0	4	0	1	0	0	[illegible]
Brunswick	0	0	------	0	2	0	0	0	0	0	0	[illegible]
Savannah	0	0	------	0	0	0	1	0	0	0	0	
Florida:												
Tampa	1	0	------	0	1	0	0	0	0	0	0	[illegible]
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	------	1	120	1	6	0	1	0	0	[illegible]
Alabama:												
Birmingham	0	0	2	0	7	1	4	0	0	0	0	[illegible]
Mobile	0	0	------	1	0	0	0	0	0	0	1	[illegible]
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	1	1	1	2	0	0	0	0	[illegible]
Louisiana:												
New Orleans	1	0	1	1	18	1	16	1	0	0	1	[illegible]
Shreveport	0	0	------	0	0	0	0	0	0	0	0	[illegible]
Texas:												
Dallas	1	0	------	0	1	0	0	0	7	0	1	2
Galveston	0	0	------	0	0	0	1	0	0	1	0	[illegible]
Houston	0	0	------	1	3	0	3	2	1	0	1	
San Antonio	0	0	------	0	0	0	4	0	2	0	1	

City reports for week ended May 29, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox case	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
MOUNTAIN												
Montana:												
Billings	0	0		9	9	0	0	0	0	0	0	0
Great Falls	0	0		0	4	0	1	0	0	0	0	0
Helena	0	0		0	7	0	0	0	0	0	0	2
Missoula	0	0		0	117	0	0	0	8	0	0	0
Idaho:												
Boise	0	0		0	0	0	0	0	0	0	0	0
Colorado:												
Denver	4	0	18	0	139	1	6	0	7	0	0	6
Pueblo	0	0		0	4	0	0	0	3	0	0	2
Utah:												
Salt Lake City	0	0		0	54	0	3	0	6	0	1	27
PACIFIC												
Washington:												
Seattle	1	0		1	123	2	5	0	3	0	0	7
Spokane	2	0	1	1	37	0	4	0	1	0	0	1
Tacoma	0	0		0	7	0	1	0	2	0	0	0
California:												
Los Angeles	1	0	9	0	159	2	5	2	27	0	0	73
Sacramento	4	0	1	1	1	2	3	0	1	0	0	16
San Francisco	0	0	3	0	58	8	8	2	19	0	1	32
Total	73	6	66	22	8,549	204	372	7	1,268	1	21	1,137
Corresponding week, 1942	63	5	63	23	5,437	31	275	6	927	2	23	1,205
Average, 1938–42	76		55	[1] 16	[2] 5,235		[1] 297		1,296	10	24	1,214

Dysentery, amebic.—Cases St. Louis, 1; Los Angeles, 1.
Dysentery, bacillary—Cases: Detroit, 2, Charleston, S. C., 6, Los Angeles, 3.
Dysentery, unspecified—Cases: Richmond, 1; San Antonio, 16.
Typhus fever.—Cases. Mobile, 1; Houston, 1.

[1] 3-year average, 1940–42.
[2] 5-year median

Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1942, 34,402,100)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	2.6	0.0	5.2	2.6	1,253	43.8	54.1	0	652	0	2.6	121
Middle Atlantic	7.6	2.2	7.1	1.3	1,148	41.0	57.1	0	178	0	1.3	111
East North Central	20.0	.6	5.9	3.5	2,133	23.5	40.6	0	242	0	0	177
West North Central	5.9	0	0	3.9	1,354	27.4	84.0	0	125	0	0	205
South Atlantic	6.8	0	5.1	3.4	515	37.7	66.8	0	91	0	17.1	392
East South Central	0.0	0	14.9	14.9	949	14.9	74.7	0	8	0	7.5	82
West South Central	5.9	0	2.9	8.8	67	5.9	76.3	8.8	29	2.9	11.7	88
Mountain	32.2	0	144.7	0	2,685	8.0	80.4	0	193	0	8.0	297
Pacific	14.0	0	24.5	5.2	673	24.5	45.4	7.0	93	0	1.7	225
Total	11.1	.9	10.0	3.3	1,296	30.9	56.4	1.1	192	0.2	3.2	172

PLAGUE INFECTION IN NEW MEXICO

Plague infection has been reported proved in pools of fleas and tissue from rodents in New Mexico as follows:

Quay County: Infection proved on May 22 and 24 in pools of fleas and tissue from wood rats (*Neotoma albigula*) and grasshopper mice (*Onychomys leucogaster*) collected on U. S. Highway No. 66 at locations 15, 19, and 20 miles east of Tucumcari, Quay County, N. Mex., as follows: 330 fleas from 18 rats, 218 fleas from 23 rats, and 40 fleas from 23 mice; tissue from 1 mouse.

Sandoval County: Infection proved May 24 in a pool of 25 fleas from 30 grasshopper mice (*Onychomys* sp.) taken 2 miles west of Bernalillo on New Mexico Highway No. 44.

Torrence County: Collected May 8, a pool of 49 fleas from 2 thirteen-striped ground squirrels (*C. tridecemlineatus*) taken 2 miles south of Moriarty on State Highway No. 41.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended May 15, 1943.—During the week ended May 15, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	1	23		84	259	33	13	27	70	510
Diphtheria		18	14	24	1	7	1	•		65
German measles		10		26	127	24	7	27	16	237
Influenza		5	2		38	8	2		8	63
Measles	1	117	3	518	1,708	135	182	257	776	3,607
Meningitis, meningococcus		1	1	1	6					9
Mumps	1	80	2	18	997	76	43	103	182	1,502
Poliomyelitis				1		1		3		5
Scarlet fever	3	26	24	84	341	56	37	38	47	656
Tuberculosis (all forms)		10	3	89	74	18		15	35	244
Typhoid and paratyphoid fever				6	1			1		8
Undulant fever				1	1					2
Whooping cough			1	85	191	81	6	31	79	474

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Basutoland.—For the period March 1–15, 1943, 4 cases of plague with 3 deaths were reported in Basutoland.

Indochina—Cochinchina.—For the week ended February 27, 1943 1 case of plague with 1 death was reported in Cochinchina, Indochina.

Typhus Fever

Guatemala.—For the month of April 1943, 78 cases of typhus fever with 17 deaths were reported in Guatemala.

Turkey.—According to information dated May 31, 1943, typhus fever has reached the epidemic stage in Turkey, and is said to be the worst since 1905. In one day 62 new cases were reported in Ankara.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year

Public Health Reports

VOLUME 58 JUNE 25, 1943 NUMBER 26

IN THIS ISSUE

Duration of Disabling Sickness Among Industrial Workers

Health Officer's Place in Management of Mental Illness

Transmission of American Q Fever by *Ornithodoros* Ticks

CONTENTS

Public Health Reports

Vol. 58 • JUNE 25, 1943 • *No. 26*

STUDIES ON THE DURATION OF DISABLING SICKNESS

IV. Duration of Disability from the Nonrespiratory-Nondigestive Diseases among Male Employees with Particular Reference to the Older Worker [1]

By WILLIAM M GAFAFER, *Senior Statistician*, and ROSEDITH SITGREAVES, *Junior Statistician, United States Public Health Service*

The induction of physically fit young men into the armed services has made it necessary for industry to draw more and more on women and older men, as well as on the physically less fit. With the introduction of large numbers of these persons into the industrial environment there has arisen an increased need for the investigation of certain problems that are closely related to the adequate production of the materials of war.

Foremost among these problems is that of absenteeism accounted for by sickness and nonindustrial injuries which the present series of papers on the duration of disabling sickness is investigating. Three papers (*1* *3*) have appeared thus far. Each presents two basic tables, a table of frequency rates and a table of disability rates. The frequency table gives the average annual number of absences per 1,000 persons connected with disabilities of a specified number of days, *t* or more; the disability table, on the other hand, shows the average annual number of days of disability per person resulting from all disabilities contributing *t* days or less.

In the first paper (*1*) the factors of sex and broad cause group were considered with the use of data from the records of 25 industrial sick benefit organizations with waiting and maximum benefit periods of varying length, and the value of *t* in the two basic tables varying from 8 through 372 days.

The second paper (*2*), based on absences of 1 calendar day or longer occurring among male workers of a public utility, presented the effect of introducing disabilities of less than 8 days' duration, and specifically the effect of the respiratory group of diseases with its preponderance of short absences.

The third paper of the series (*3*) concerned itself with the effect of the age of the worker, the supporting data being drawn from the recorded disability experience of male employees of an oil refining company The two basic tables were presented by broad age and cause groups,[2] the *t* in both tables varying from 8

[1] From the Division of Industrial Hygiene, National Institute of Health. For earlier papers in this series see references *1–3*. The present report constitutes the third paper based on data from an oil refining company; the other two are numbers *3* and *4* in the list of references.

[2] Respiratory diseases, digestive diseases, nonrespiratory-nondigestive diseases, and nonindustrial injuries.

through 365 days. For each cause group and each value of t the frequency and disability rates for the group of males 50 years of age and over were higher than the corresponding rates for the group under 50 years of age. In general, the ratio of the rates, both frequency and disability, for the older age group to the corresponding rates for the younger group increased as t increased. For $t=8$ the ratio of the frequency rates for nonindustrial injuries, respiratory diseases, and digestive diseases, respectively, revealed for males 50 and over excesses of less than 25 percent, while the rate for nonrespiratory-nondigestive diseases among the older group was over twice the corresponding frequency for the younger group. The ratio of disability rates for nonindustrial injuries, respiratory diseases, and digestive diseases for $t=365$ showed excesses for the older group of 83, 57, and 31 percent, respectively; the disability rate for the nonrespiratory-nondigestive diseases, however, was over 3 times the corresponding rate for the younger males.

Because of the increasing importance of age in the wartime industrial economy a more detailed investigation of these nonrespiratory-nondigestive diseases is indicated. It is the purpose of the present inquiry to examine certain pertinent indexes determined by absences on account of specific nonrespiratory-nondigestive diseases with reference particularly to the older worker.

The basic data were yielded by the sick benefit organization of an oil refining company; information concerning the administrative procedures subscribed to by the organization will be found in references *3* and *4*. The males in the record are principally white; the analysis covers the 7 years 1933–39. Only recorded absences of 8 calendar days or longer are included, the duration of the absence in days being the number of days from the *onset* of illness to the date of termination of benefits, no benefits being paid after the 365th day.

ANALYSIS OF THE DATA

During the 7 years 1933–39, a total of 67,745 male-years of membership in the sick benefit organization yielded 8,700 absences of 8 days or longer on account of sickness and nonindustrial injuries resulting in 287,885 days of disability. Of the 8,700 absences 2,612 causing 115,493 days lost were among males 50 years of age and over, and 6,080 yielding 172,110 days were among males under 50 years of age. No age was reported for 8 absences accounting for 282 days. An available age distribution of January 1, 1938, applied to the membership of the 7-year period, results in 15,649 and 52,096 male-years of membership for the older and younger groups, respectively. These memberships give rise to frequency and disability rates among males 50 and over of 166.9 absences per 1,000 males and 7.380 days per male; the corresponding rates for the younger group are 116.7 and 3.304.

Frequency, disability, and severity rates by age group and cause.—An age comparison of frequency, disability, and severity rates according to broad cause group and specific nonrespiratory-nondigestive diseases is shown in table 1. For males 50 years of age and over the frequency

TABLE 1.—*Average annual number of absences per 1,000 males on account of sickness and nonindustrial injuries, average annual number of days of disability per male, and average number of days per absence, by broad age group and cause; experience of male employees of an oil refining company, absences lasting 8 calendar days or longer and ending during 1938–39, inclusive*

Cause	Annual number of absences per 1,000 males		Annual number of days of disability per male		Average number of days per absence		Number of absences		Number of days of disability	
	Under 50	50 and over	Under 50	50 and over	Under 50	50 and over	Under 50	50 and over	Under 50	50 and over
All disabilities	116.7	166.9	3.304	7.380	28.3	44.2	6,080	2,612	172,110	115,493
Nonindustrial injuries	12.1	15.0	396	.724	32.8	48.2	629	235	20,644	11,327
Sickness	104.6	151.9	2.908	6.656	27.8	43.8	5,451	2,377	151,466	104,166
Respiratory diseases	55.2	65.2	1.051	1.646	19.0	25.2	2,874	1,021	54,728	25,764
Digestive diseases	16.6	19.9	.588	.769	35.3	38.7	866	311	30,611	12,037
Nonrespiratory-nondigestive diseases [1]	32.8	66.8	1.269	4.241	38.6	63.5	1,711	1,045	66,127	66,365
Infectious and parasitic diseases	2.6	2.0	.083	.051	32.3	25.0	134	31	4,331	807
Cancer, all sites	.7	3.6	.070	.492	101.3	137.4	36	56	3,646	7,697
Rheumatic diseases [2]	10.2	20.2	.261	.541	25.7	26.8	530	316	13,612	8,461
Diseases of the nervous system [3]	2.6	4.2	.195	.504	75.7	119.5	134	66	10,146	7,886
Diseases of the eyes and ears	1.7	2.6	.057	.161	32.1	62.9	92	40	2,952	2,517
Diseases of the heart and arteries	2.2	14.4	.194	1.654	89.5	115.0	113	225	10,111	25,881
Other diseases of the circulatory system	2.3	5.1	.062	.176	26.4	34.4	123	80	3,243	2,756
Diseases of the genitourinary system	3.0	4.0	.107	.216	35.4	54.4	158	62	5,598	3,375
Diseases of the skin	4.1	4.3	.080	.096	19.4	22.9	215	68	4,106	1,554
All other diseases [1]	3.4	6.4	.160	.347	47.3	53.8	176	101	8,322	5,431

[1] Includes a negligible number of absences of ill-defined or unknown diagnosis.
[2] Rheumatism, acute and chronic; neuralgia, neuritis, sciatica, and diseases of the organs of movement except diseases of the joints.
[3] Except neuralgia, neuritis, sciatica.

Person-years of membership: Under 50 years of age, 52,006; 50 years of age and over, 15,649

of all nonrespiratory-nondigestive diseases is similar in magnitude to the frequency of respiratory diseases; the disability rate for the nonrespiratory-nondigestive diseases, however, is over 2.5 times the corresponding rate for the respiratory group. Among males under 50 years of age the nonrespiratory-nondigestive disease frequency is approximately 40 percent less than the frequency of respiratory diseases while the two disability rates are of similar magnitude.

Among the specific nonrespiratory-nondigestive diseases the group of rheumatic diseases [3] ranks first in frequency for each of the two age groups and yields the highest disability rate for males under 50 years of age. For the older males diseases of the heart and arteries were responsible for the most lost time, over a day and a half per male per year, and rank second in frequency for the older group.

In general, when the two age groups are compared, marked excesses in both frequency and disability rates are shown for the older group. Excesses of over 100 percent in frequency may be noted for diseases of

[3] Rheumatism, acute and chronic; neuralgia, neuritis, and sciatica; and diseases of the organs of movement except diseases of the joints.

the heart and arteries (555 percent), cancer, all sites (414 percent), other diseases of the circulatory system (122 percent), and the group of nonrespiratory-nondigestive diseases as a whole (104 percent). Infectious and parasitic diseases showed the only defect for the older group while the excess for diseases of the skin was only 5 percent.

The excesses in the disability rate are in every case higher than the corresponding ones for frequency, excesses of over 200 percent in time lost being noted for diseases of the heart and arteries (753 percent), cancer, all sites (603 percent), and the total group of nonrespiratory-nondigestive diseases (234 percent). A defect in the disability rate is shown for infectious and parasitic diseases.

Severity rates are also higher for the older group, an observation which could have been predicted from a comparison of the excesses yielded by the frequency and disability rates.

Cancer, all sites, the rheumatic diseases, and diseases of the nervous system, respectively, caused among the older group an average loss of approximately half a day per male annually. When these three causes are combined with diseases of the heart and arteries they are found to account for 75 percent of all time lost by males 50 years of age and over because of the nonrespiratory-nondisgestive diseases, the corresponding percentage for the younger group being 57. These four causes are thus of considerable importance with respect to lost time particularly among the workers of the older age group and have, therefore, been selected for further investigation principally with the use of the two basic tables previously described.

Average annual number of absences per 1,000 males on account of nonrespiratory-nondigestive diseases disabling for a specified number of days, t *or more.*—The pertinent data are given in table 2 and shown graphically in figure 1. The table presents the frequency of ended absences of duration t days or more according to age group for all nonrespiratory-nondigestive diseases and for the four selected causes. The values of t are taken at 28-day intervals from 28 through 364 with a 21-day interval from 8 to 28. The frequencies for $t=365$ are also given in table 2 and represent those absences extending over at least one year.

It was observed in the preceding section that among the nonrespiratory-nondigestive diseases the rheumatic group caused the greatest number of 8-day or longer absences (namely, for $t=8$) in each age group; it will be noted in table 2 that among the older group diseases of the heart and arteries rank first in frequency for all other values of t, while for males under 50 years of age the rheumatic diseases continue to rank first but for only $t=28$ and $t=56$. For each age group the rheumatic diseases show the most rapid decline in frequency with increasing values of t, the rates when t is 28 for the older and younger groups, respectively, being only 28 and 27 percent of the initial fre-

TABLE 2.—*Average annual number of absences per 1,000 males, by broad age group and cause, on account of nonrespiratory-nondigestive diseases disabling for a specified number of days, t or more; experience of male employees of an oil refining company, absences lasting 8 calendar days or longer and ending during 1933–39, inclusive*

t days	Nonrespiratory-nondigestive diseases [1]		Cancer, all sites		Rheumatic diseases		Diseases of the nervous system		Diseases of the heart and arteries	
	Under 50	50 and over	Under 50	50 and over	Under 50	50 and over	Under 50	50 and over	Under 50	50 and over
	Annual number of absences per 1,000 males disabling for *t* days or more									
8	32 84	66.78	0 69	3.58	10.17	20 19	2 57	4 22	2 17	14 38
28	11 57	31 31	.58	3.13	2.71	5 69	1 61	2 81	1.54	9 97
56	5 53	18 98	.38	2.56	1.17	2.04	.88	2.11	1.02	7 41
84	3 07	13 48	.27	2.11	.40	.83	.61	1.85	.75	5 62
112	2.00	10 10	.21	1.53	.12	.45	.44	1.41	.50	4 79
140	1.59	7 80	.15	1 15	.08	.26	.40	1.15	.42	3.90
168	1 29	6 58	.10	.89	.02	.26	.35	1.15	.40	3 20
196	1 00	6 01	.08	.89	.02	.06	.29	1 09	.27	3 07
224	84	5 62	.08	.83	.02	.06	.23	.96	.23	2 94
252	77	5 05	.08	.77	.02	0	.23	.89	.19	2 75
280	63	4 60	.08	.70	02	0	.19	.83	.15	2 56
308	60	3 96	.08	.58	0	0	.19	.70	.15	2 36
336	54	3 64	.08	.51	0	0	.17	.64	.12	2.17
364	48	3 07	.06	.26	0	0	.15	.64	.10	1 85
365	.46	2 88	.06	.19	0	0	.15	.58	.10	1.79
	Number of absences disabling for *t* days or more									
8	1,711	1,045	36	56	530	316	134	66	113	225
28	603	490	30	49	141	89	84	44	80	156
56	288	297	20	40	61	32	46	33	53	116
84	160	211	14	33	21	13	32	29	39	88
112	104	158	11	24	6	7	23	22	26	75
140	83	122	8	18	4	4	21	18	22	61
168	67	103	5	14	1	4	18	18	21	50
196	52	94	4	14	1	1	15	17	14	43
224	44	88	4	13	1	1	12	15	12	46
252	40	79	4	12	1	0	12	14	10	43
280	33	72	4	11	1	0	10	13	8	40
308	31	62	4	9	0	0	10	11	8	37
336	28	57	4	8	0	0	9	10	6	34
364	25	48	3	4	0	0	8	10	5	29
365	24	45	3	3	0	0	8	9	5	28

[1] Includes a negligible number of absences of ill-defined or unknown diagnosis.

Person-years of membership: Under 50 years of age, 52,096; 50 years of age and over, 15,649.

quencies; for diseases of the heart and arteries the corresponding percentages are 69 and 71. This indication of the preponderance of comparatively short absences on account of the rheumatic diseases is also evidenced by the fact that none of the absences from this cause lasted as long as a year, the longest duration being 300 days.

The frequencies for cancer, diseases of the nervous system, and diseases of the heart and arteries, respectively, are consistently higher for males 50 years of age and over. The rates for the rheumatic diseases are also higher among the older group, except for $t=252$ and $t=280$. It will be seen in figure 1 that the greatest age differences are shown for diseases of the heart and arteries, and cancer. The frequency of cancer among the older group for $t=8$ is approximately 5 times the corresponding rate for the younger group, this ratio rising to 11 at $t=196$, and dropping to 4 when $t=364$. The frequency for $t=8$ of

diseases of the heart and arteries among the older males is almost 7 times the rate for younger males, and this ratio rises to 18 when t is 364.

It is of interest to note that for males under 50 years of age the frequency patterns of diseases of the nervous system and diseases of the heart and arteries are similar, while for males 50 years of age and over the same observation holds for the frequency patterns of diseases of the nervous system and cancer. If the three causes with absences lasting a year or more are examined for t=365 it will be observed in table 2 that the three frequencies yielded for the older group are higher,

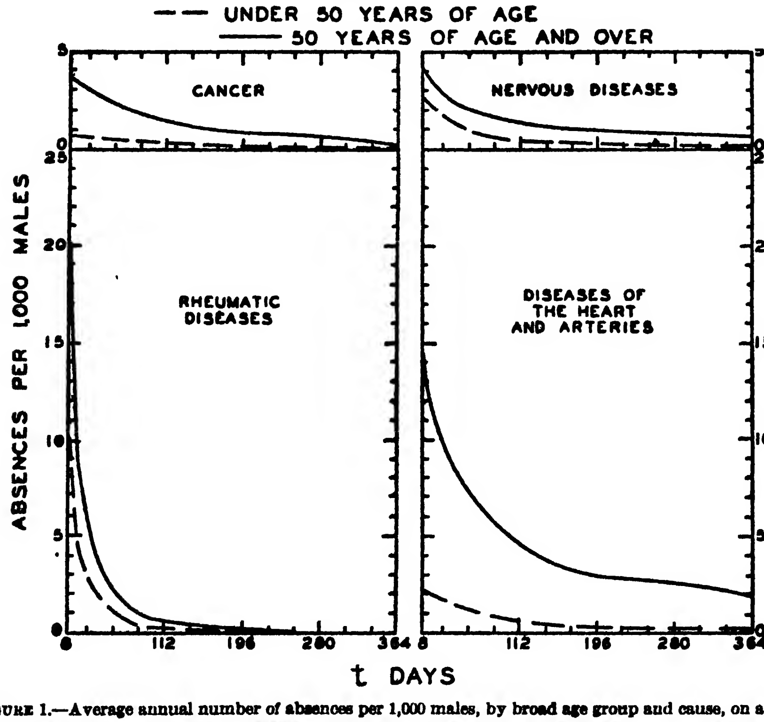


FIGURE 1.—Average annual number of absences per 1,000 males, by broad age group and cause, on account of nonrespiratory-nondigestive diseases disabling for a specified number of days, t or more; experience of male employees of an oil refining company, absences lasting 8 calendar days or longer and ending during 1933–39, inclusive.

respectively, than the highest frequency (0.15 for diseases of the nervous system) yielded for the younger group. Indeed in the present experience almost 2 out of every 1,000 males 50 years of age and over were disabled for at least 1 year on account of diseases of the heart and arteries.

Percentage distribution of causes on specified days of disability after onset.—The number of absences of duration t days or more is equivalent to the number of persons still absent on the t^{th} day of disability after onset, or to the number of absences on that day, or to the number

of days contributed by the t^{th} day to the total number of days lost. This basic relationship suggests a further examination of the data of the last section in respect of the percentage distribution according to specific nonrespiratory-nondigestive causes of absences on specified days of disability after onset. Figure 2 presents graphically for each age group the appropriate percentages derived from table 2.

For each of the specified days of disability after onset the figure shows the percentage contribution of the four selected causes and all other nonrespiratory-nondigestive diseases to the total number of

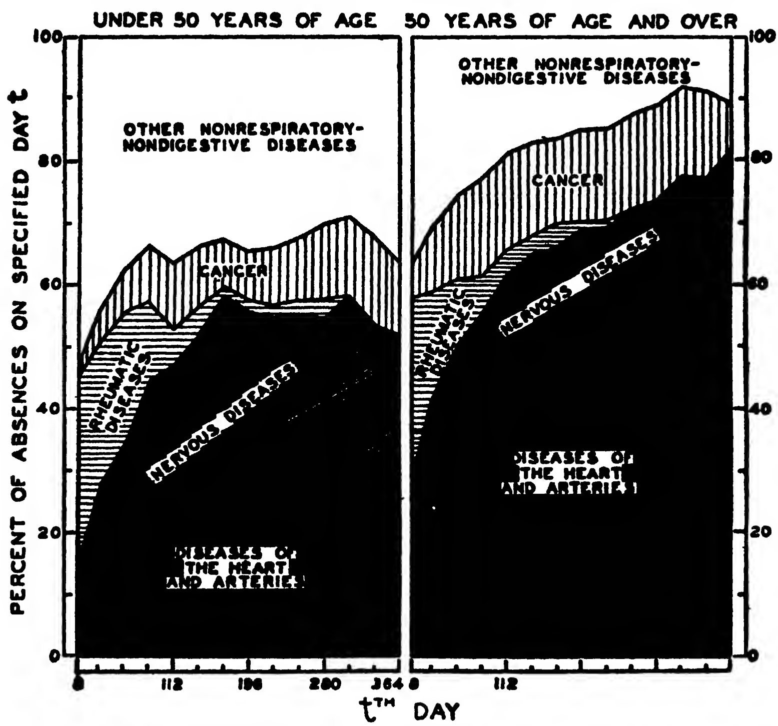


FIGURE 2.—Percentage distribution, according to cause, of absences on account of nonrespiratory-nondigestive diseases on a specified day, t, of disability after onset, for two broad age groups; experience of male employees of an oil refining company, absences lasting 8 calendar days or longer and ending during 1933–39, inclusive.

nonrespiratory-nondigestive disease absences on that day. Thus on the 8th day of disability after onset among males 50 years of age and over diseases of the heart and arteries were responsible for 22 percent of the absences, diseases of the nervous system 6 percent, the rheumatic diseases 30 percent, cancer 5 percent, and all other nonrespiratory-nondigestive diseases 37 percent. The pattern of the figure is determined by the duration and frequency of absences due to these five causes. If all of the absences had lasted 364 days the resulting pattern would consist of five rectangles; if, furthermore, the specific

causes had yielded equal frequencies the rectangles would have been of equal area.

For each age group the rheumatic diseases accounted for approximately 30 percent of the absences on the 8th day of disability. With increasing values of t these percentages decrease until they become zero on the 308th and 252d days for the younger and older groups, respectively. This is in agreement with the observation referred to in the preceding section, namely, that no absence on account of the rheumatic diseases lasted longer than 300 days.

Among males under 50 years of age absences due to diseases of the heart and arteries increase from 7 percent of the nonrespiratory-nondigestive disease absences on the 8th day of disability to 31 percent on the 168th day and gradually decrease to 20 percent on the 364th day. Cancer has the smallest initial percentage, 2 percent, increasing to 14 percent on the 336th day and dropping to 12 percent on the 364th day. This change in the percentage contribution of cancer may be partially attributed to the fact that the absences are of relatively long duration, but terminate, often in death, before the end of a year.

The pattern for males of the older group is somewhat different from that of the younger group. It will be noted that for each specified day of disability after onset the total percentage for the four selected causes among the older group is greater than the corresponding summation for the younger group. This excess reflects primarily the increased contribution of diseases of the heart and arteries. The pattern for the rheumatic diseases is somewhat similar for both age groups, while diseases of the nervous system for the older group contribute a markedly smaller proportion to absences on specified days. The percentages of absences due to cancer are, in general, slightly higher among men 50 years of age and over. Diseases of the heart and arteries, however, are outstanding for the older group; beginning with 22 percent of all nonrespiratory-nondigestive disease absences on the 8th day of disability this proportion rises to 60 percent of all absences extending through the 364th day of disability after onset.

Average annual number of days of disability per male resulting from absences on account of nonrespiratory-nondigestive diseases contributing t *days or less.*—The second of the basic tables is presented in table 3 and graphically in figure 3. It should be noted that the days of disability do not include those arising from absences which terminated before the 8th day of disability.

For males under 50 years of age the rates for the rheumatic diseases are consistently greater than those for the other causes, while the rates for cancer are consistently low. The disability rates for diseases of the heart and arteries and diseases of the nervous system are similar in magnitude.

TABLE 3.—*Average annual number of days of disability per male, by broad age group and cause, resulting from absences on account of nonrespiratory-nondigestive diseases contributing t days or less; experience of male employees of an oil refining company, absences lasting 8 calendar days or longer and ending during 1933–39, inclusive*

t days	Nonrespiratory-nondigestive diseases [1]		Cancer, all sites		Rheumatic diseases		Diseases of the nervous system		Diseases of the heart and arteries	
	Under 50	50 and over	Under 50	50 and over	Under 50	50 and over	Under 50	50 and over	Under 50	50 and over
	Annual number of days of disability per male resulting from absences contributing *t* days or less									
8	2627	.5342	.0055	.0286	.0814	.1615	.0206	.0337	.0174	.1150
28	6274	1 4147	.0179	.0957	.1794	.3671	.0603	.0989	.0529	.3545
56	.8472	2 0816	.0312	.1760	.2275	.4633	.0947	.1657	.0886	.5894
84	9620	2 5233	.0401	.2424	.2482	.5006	.1140	2203	.1128	.7686
112	1 0323	2 8516	.0470	.2943	.2540	.5181	.1288	.2663	.1306	.9154
140	1 0825	3 0951	.0519	.3286	.2575	.5209	.1408	3021	.1437	1.0361
168	1 1219	3 2941	.0552	.3575	.2588	.5340	.1513	.3343	.1552	1 1338
196	1 1536	3 4691	0573	.3825	.2593	.5377	1602	3653	.1646	1 2220
224	1 1803	3 6320	.0595	4062	.2598	.5395	.1678	3941	.1719	1.3064
252	1 2026	3.7810	0616	.4285	.2604	.5407	.1742	4200	.1776	1.3861
280	1 2214	3 9175	0638	.4488	.2609	.5407	.1797	4448	.1826	1.4611
308	1 2385	4 0383	0659	.4677	.2613	.5407	.1850	.4660	.1869	1.5316
336	1 2547	4 1455	0681	.4830	.2613	.5407	.1901	4855	.1910	1 5951
364	1 2689	4.2380	.0699	.4917	2613	.5407	.1946	.5034	.1940	1 6521
365	1 2693	4.2408	.0700	4919	.2613	.5407	.1948	.5039	.1941	1.6538
	Number of days of disability resulting from absences contributing *t* days or less									
8	13,688	8,360	288	448	4,240	2,528	1,072	528	904	1,800
28	32,684	22,138	934	1,498	9,34	5,744	3,141	1,547	2,756	5,548
56	44,134	32,575	1,623	2,754	11,854	7,250	4,934	2,593	4,614	9,223
84	50,115	39,487	2,089	3,793	12,931	7,834	5,939	3,448	5,877	12,028
112	53,777	44,625	2,448	4,606	13,277	8,108	6,708	4,167	6,803	14,325
140	56,396	48,435	2,705	5,143	13,414	8,245	7,335	4,727	7,485	16,214
168	58,448	51,550	2,875	5,594	13,480	8,357	7,880	5,231	8,084	17,743
196	60,089	54,288	2,987	5,986	13,508	8,414	8,345	5,716	8,576	19,123
224	61,490	56,837	3,099	6,356	13,536	8,442	8,740	6,168	8,957	20,444
252	62,653	59,169	3,211	6,706	13,564	8,461	9,076	6,572	9,252	21,691
280	63,628	61,305	3,323	7,024	13,592	8,461	9,360	6,960	9,512	22,865
308	64,523	63,196	3,435	7,319	13,612	8,461	9,640	7,293	9,736	23,968
336	65,367	64,873	3,547	7,559	13,612	8,461	9,906	7,597	9,950	24,961
364	66,103	66,320	3,643	7,694	13,612	8,461	10,138	7,877	10,106	25,853
365	66,127	66,365	3,646	7,697	13,612	8,461	10,146	7,886	10,111	25,881

[1] Includes a negligible number of absences of ill-defined or unknown diagnosis

Person-years of membership Under 50 years of age, 52,096, 50 years of age and over, 15,649.

For males 50 years of age and over diseases of the heart and arteries are higher than any of the other three causes except for $t=8$ and $t=28$; the rheumatic diseases have the highest disability rates for these values of t and are second in rank for all other values. It is of interest to observe in this connection that the curves for the rheumatic diseases are different from those of the other causes for each age group in that they rise somewhat abruptly and then tend to flatten out. This reflects the fact that there was an unusually high frequency of absences of comparatively short duration, very few days being contributed to the disability rate after $t=84$.

The most striking picture in the age comparisons shown in figure 3 is again given by diseases of the heart and arteries. The number of

days of disability accumulated by this cause among the older group of males after a year of disability is greater than the combined days accumulated by the other three causes, and yields a rate 8.5 times the corresponding disability rate for the younger age group.

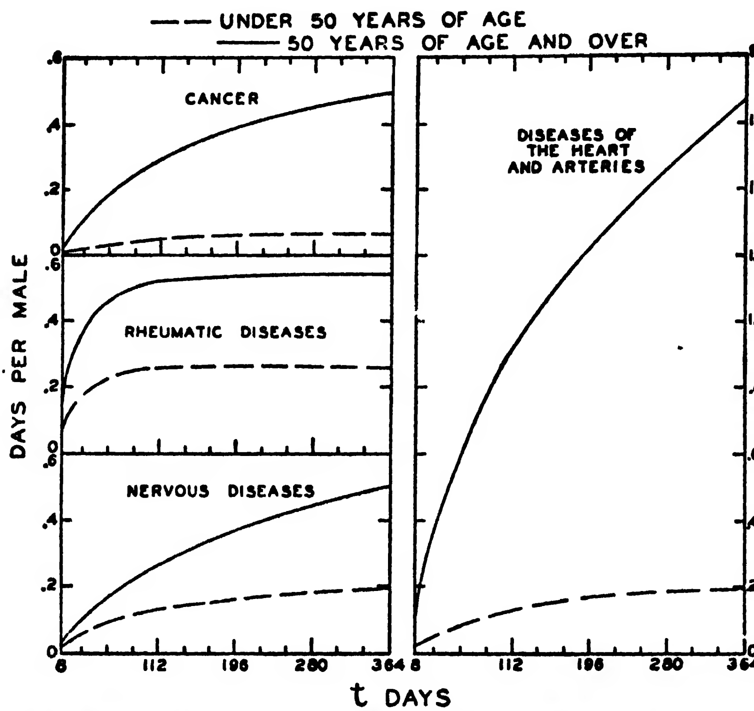


FIGURE 3.—Average annual number of days of disability per male, by broad age group and cause, resulting from absences on account of nonrespiratory-nondigestive diseases contributing t days or less; experience of male employees of an oil refining company, absences lasting 8 calendar days or longer and ending during 1933–39, inclusive.

SUMMARY

This, the fourth of a series of papers on the duration of disabling sickness, is based on absences lasting 8 calendar days or longer, and presents principally an age comparison for males of certain pertinent indexes determined by specific nonrespiratory-nondigestive diseases. Four specific causes are presented. These causes, which were the principal time-losers among males 50 years of age and over, are diseases of the heart and arteries, the rheumatic diseases, diseases of the nervous system, and cancer, all sites. Thus the frequency of 8-day or longer absences on account of diseases of the heart and arteries among this older group of males was approximately 6.5 times the corresponding frequency for men under 50, the number of days lost per man from this cause being 8.5 times that for the younger group.

REFERENCES

(1) Gafafer, W. M., and Frasier, E. S.: Studies on the duration of disabling sickness. I. Duration of disability from sickness and nonindustrial injuries among the male and female memberships of 25 industrial sick benefit organizations, 1935–37, inclusive. Pub. Health Rep., 55: 1892–1903 (Oct. 18, 1940). (Reprint No. 2201.)

(2) Gafafer, W. M., and Frasier, E. S.: Studies on the duration of disabling sickness. II. Duration of disability from sickness and nonindustrial injuries among male workers, disabilities lasting one calendar day or longer. Pub. Health Rep., 57: 1378–1384 (Sept. 11, 1942). (Reprint No. 2404.)

(3) Gafafer, W. M., Sitgreaves, R., and Frasier, E. S.: Studies on the duration of disabling sickness. III. Duration of disability from sickness and nonindustrial injuries among the male employees of an oil refining company with particular reference to the older worker, 1933–39, inclusive. Pub. Health Rep., 57: 112–125 (Jan. 23, 1942). (Reprint No. 2350.)

(4) Gafafer, W. M., and Sitgreaves, R.: Disabling morbidity, and mortality from cancer among the male employees of an oil refining company with reference to age, site, and duration, 1933–38, inclusive. Pub. Health Rep., 55: 1517–1526 (Aug. 23, 1940). (Reprint No. 2192.)

THE HEALTH OFFICER'S PLACE IN THE MANAGEMENT OF MENTAL ILLNESS *

By Samuel W. Hamilton, M. D., *Mental Hospital Advisor, Division of Mental Hygiene, United States Public Health Service*

When mental illness develops, wealthy people are expected to look after the needs of members of their own families, and usually are in position to do so; but somebody has to help the ordinary family when an unexpected problem of mental illness arises. Most families are without experience with that sort of trouble and need strong and skillful aid. In some States this is a function of the poor officer and in far too many it is the duty of the sheriff. A movement to place these sick people in the hands of the health officer is discerned, and this paper briefly reviews that movement from 1910 to the present time. It started in New York and has now spread to eight other States. The latest adherent is Oregon, so it can be said that the movement has reached from coast to coast.

Under the laws previously in force in New York, which in intent were not very different from the laws of other States in the Northeast, the responsibility for immediate help in case of mental illness in indigent families lay with an overseer or superintendent of the poor, whichever was available. If the patient could not stay at home until the nurse from the State hospital arrived to take him, he was removed for temporary care to the almshouse. Probably he knew little about almshouses and had never before been in one. But some patients were excited and disturbed the peace. A very humane law of 1827 had forbidden the use of the jail for detention of mentally ill persons

* Presented at the ninety-ninth annual meeting of the American Psychiatric Association, Detroit, Mich., May 11, 1943.

and the law was pretty well observed, but there was a loophole in that other places of temporary observation might not be strong enough to protect the community from an excited man, so some did actually go to jail before the determination of their mental condition. The poor officer was responsible for calling two physicians to examine the patient, and for getting an order of commitment from the nearest available court. The State Charities Aid Association reported that in one year 18 percent of committed patients had come to the mental hospitals from jails, station houses, and lock-ups, and such a percentage was too high for New York to think of without reproach.

Those who were interested in the mentally ill wanted better provision for the new patient, and took advantage of the increasing scope of public health work. In this century men were asserting that mental health is only one section of the broad field of public health, that it is illogical to think of public health as unconcerned with disorders that affect the thoughts and feelings and actions of a person. A change in the law was proposed in 1910 on the ground that the mentally ill should from the onset of their attack have the benefit of medical care, should be treated as primarily sick people rather than as primarily poor or primarily unruly people, and the new law was duly enacted

Under the new law the health officer was made responsible for the care of the alleged insane pending commitment. On learning that "any poor or indigent insane or apparently insane person" was in need of attention the health officer was authorized and directed to provide proper care, treatment, and nursing, and to take necessary steps to have him examined for commitment, if need be. What was more, other county, city, and district authorities were required to notify the health officer whenever any such case came to their attention. There were teeth in the law; the fiscal authorities were required to audit the health officer's bills when he hired a room, hired an attendant, and ordered meals for the patient. The importance of this new legislation was not at all lessened by the fact that New York City, Erie County, and Albany County were exempted because they already had psychopathic services in general hospitals which supplied this temporary care. The transfer of duties was complete on paper. Of course it took several years to change the custom of people, so that they would turn to the health officer for a kind of help that had formerly been given by the overseer of the poor.

The law worked very well. The writer was at that time in the New York State service and learned from some of his patients how much better they were now looked after while waiting to come to the hospital than had been the case when the sheriff or overseer of the poor was looking after them. The stigma of association with criminals had been eliminated.

Presently another step in advance was taken. To go back to history, the traditional procedure was that someone would tell the public authorities that John Doe seemed to be mentally ill. The public authorities would arrange for an examination. This might take a day or two and John Doe had to wait. The delay was increased in some States by so-called protective legislation that was enacted around 1870 because of fear that a person who seemed to be mentally ill, but was really not mentally ill, might be mishandled. These "protective laws" required that notice must be served and a hearing held.

The health officer was functioning so well under the new arrangement that before long it was decided to cut the delay between examination and hospital. In 1914 it was provided in New York that the health officer might over his own signature request admission to a State hospital for the indigent mentally ill. His request was to be in writing and must accompany the patient to the hospital. The whole responsibility for passing on the acceptability of the patient in the hospital was placed on the superintendent or his representative, for they were psychiatrists and the health officer was not. If the superintendent thought the request proper he could take the patient in and hold him five days, during which time the patient might get well; if he did not get well another legal arrangement must be made for him. But meanwhile the difficult initial excitement or the suicidal frenzy had been looked after suitably from a medical standpoint because all delay had been averted, and on the legal side no stigma of commitment was inflicted. On the other hand, the superintendent might not think that the patient came within the scope of the work of the State hospital. In this case he did not accept the patient. New York does not think well of persons who are drunk or have delirium tremens, and it was provided that no such case could be received on this paper.

This law worked just as well as the first one and in later years the time that a patient might be held on such a health officer's request was raised from 5 to 10, and later to 30 days. All patients with mental illness and not simply the poor and indigent were included in its scope, and after a while it was made legal to use the same method of admission to a private licensed institution as well as to a public hospital. Such an extension of the health officer's responsibility in the most populous State in the Union was a direct and forceful way of converting the talk about the place of mental health in public health into a mode of action. It is a subject that should receive serious thought today in communities where large numbers—even nine-tenths—of the mental hospital patients are brought to the hospital from jail by the sheriff's deputies, and not infrequently in handcuffs, ropes, or even chains. Lawmakers have not always thought of these matters as medical problems and throughout the breadth of our land

today there is a vast number of communities in which the mentally ill are temporarily cared for by anyone except the health department.

In providing for the welfare of the mentally ill, important improvements sometimes are slow in traveling from one State to another. There is, for instance, family care of mentally ill patients who have been in a State hospital and are now in condition to leave it, but have no home to which to go. Massachusetts provided family care over 40 years before other States took it up. So, too, the health officer's responsibility has been extended very slowly, and the matter is brought up now in order to review briefly what authority has been conferred on the health officer in the eight other States that mention him in their laws relating to mental illness.

1. Oregon has a relatively new law based upon the New York statute, and not yet working smoothly. It gives the health officer custodial care of the mentally ill until they are admitted and requires that the patients be held in some more suitable place than jail. The medical profession is said to believe in the law thoroughly and the sheriffs cooperate in most cases, though some of them are skeptical. The expense is, of course, greater than under the old system.

2. Arkansas adopted a new mental hygiene law last winter. One clause provides that on the request and certificate of a health officer, any person suffering from acute psychosis, including acute or chronic alcoholism or drug addiction, may be admitted to the State hospital in case he needs immediate hospitalization. The health officer may also start commitment proceedings in probate court. Incidentally, the same powers are extended to all licensed physicians.

3. Kentucky has adopted the provision for admission on a health officer's request, such an arrangement being valid for 10 days. A quotation from an unnamed health officer in Kentucky is to the point. "Although I have used my authority to commit to an institution a mentally ill patient on only one occasion, which occurred just a few days ago, I appreciated that authority at the time and feel that I rendered a real service to the patient and the institution, namely the county infirmary, where the patient resided. I am convinced that such emergency temporary commitment is essential to prevent a mentally ill patient from harming himself or community, and the possible embarrassment of a jail sentence caused by the usual delay necessary for court commitment. In my opinion the health officer is the logical person to have this temporary authority."

4. Massachusetts authorizes a State hospital superintendent to admit a patient for 10 days on the request of any physician or any member of a board of health. Relatively few health officers in Massachusetts are physicians, and this clause in the law accordingly has very little use, since some practicing physician is much more likely to be consulted about the patient.

5. The Commissioner of Health of New York remarks that the 323 health officers' requests in New York State during a fiscal year were a very small fraction of the 19,174 admissions to the State hospitals. It may be recalled that the mass of admissions come from cities where observation wards in general hospitals provide temporary care. The smaller cities and towns yield most of the health officers' requests and this procedure has proved very helpful. As Commissioner Godfrey says, this type of commitment appears to be very satisfactory from the standpoint of the mental hygiene authorities.

6. In Missouri a patient who has not been declared insane may be admitted to the State hospital for six weeks on a certificate of diagnosis by a health official. The State health commissioner says that in county units where an independent medical committee program is conducted the health officer shows considerable interest in mental cases and extends considerable care. In other counties the health officer examines some patients and reports to the county court whether the patient should be committed.

7. Ohio has a law under which the health officer can order a patient to be taken to a mental hospital for five days, to a minor jail for not over 12 hours, to a county jail for longer.

8. Utah provides for emergency admission and treatment up to 10 days on the written request of a health officer to the superintendent of the State hospital. The State health commissioner believes that this is a desirable program but that few district or local health officers have participated in it.

9. In Rhode Island no authority is given to health officers generally, but in the city of Providence an officer of the health department may request temporary care not to extend more than 15 days in the city hospital, which maintains a psychiatric service. The health department is called upon in cases where people cannot reach a physician promptly, in indigent cases, and in most cases picked up by the police who do not wish to take the responsibility of sending a person to the psychiatric ward. The superintendent of health states that very few if any mental cases are being neglected and that the arrangement works well.

This report of progress may be summed up as follows:

(1) New York places the responsibility for the immediate and temporary care of the alleged mentally ill entirely in the hands of the health officer, excepting in the cities that have psychiatric hospital wards. It also gives him authority to obtain the admission of such patients to a State hospital on his own request.

(2) Oregon gives the health officer similar responsibility for temporary care.

(3) Kentucky, Massachusetts, Missouri, Ohio, and Utah honor the health officer's request (or order) for a period of temporary treatment of a patient in the State hospital.

(4) Arkansas lets the health officer obtain admission for an acute case on request and certificate, and authorizes him to start commitment proceedings if they are needed.

(5) Rhode Island gives the city of Providence authority to admit mentally ill patients to the city hospital on a request from a health department physician.

Such procedures are greatly in the interest of the mental patient. It is therefore desirable that permissory legislation should be widely extended. It cannot be repeated too often that the patients profit by such an arrangement; nor does the health officer lose, for while somewhat more work is added to his responsibilities, the burden is nowhere excessive and his helpful relations with the community are broadened.

AMERICAN Q FEVER: EXPERIMENTAL TRANSMISSION BY THE ARGASID TICKS *ORNITHODOROS MOUBATA* AND *O. HERMSI*[1]

By GORDON E. DAVIS, *Senior Bacteriologist, United States Public Health Service*

In the continuation of a series of studies on the transmission of several disease agents by ticks of the genus *Ornithodoros*, three experiments have been performed with *O. moubata* and two with *O. hermsi* in the transmission of American Q fever. First nymphs of *O. moubata* were used for the infective feeding (larvae of this species do not feed) and first or second nymphs of *O. hermsi*. A Wyoming *Dermacentor andersoni* strain (Davis, 1939) was used for the infective feedings, and any available stock strain for immunity tests.

ORNITHODOROS MOUBATA

In November 1940, and May and August 1941, 32, 82, and 76 ticks, respectively, were allowed to engorge on guinea pigs infected with *Rickettsia diaporica*. Five ticks from each of the last two lots were ground in saline immediately after engorgement and injected into guinea pigs as controls on the infective feedings. Five ticks were injected similarly after each of the first three test feedings. All injected guinea pigs became infected.

Transmission by feeding was not obtained until the ticks had reached the adult stage. In January 1942, 12 females from experiment 1 were tested individually. Four of the host guinea pigs showed

---

[1] From the Rocky Mountain Laboratory of the Division of Infectious Diseases, National Institute of Health.

febrile periods of 4, 4, 6, and 7 days, respectively, and were subsequently immune. Seven male, 6 male, and 4 female ticks, respectively, tested by injection 670 days following the infective feeding caused the death of two of the recipient guinea pigs and a prolonged febrile period with immunity in the third.

In experiment 2, the last test feeding in the adult stage was made 381 days following the infective feeding. The incubation periods were 6 days in 2 guinea pigs, 7 in 8, 8 in 3, 9 in 4, and 10 in 2. The febrile periods varied from 2 to 8 days. There was one death. The remainder were subsequently immune.

In experiment 3, ticks were shown to be infective by feeding 355 days following the infective feeding.

Transmission through the ovum.—In experiment 1 approximately 5,000 progeny were tested for infectivity. Progeny of four females which had been shown to be infective and of four additional females that failed in transmission caused typical febrile reactions resulting in immunity. In the F2 generation the progeny of two females were tested and found to be infective.

In experiment 2, progeny were tested by feeding following the first three ovipositions using 467, 341, and 1,008 ticks, respectively. Ticks from the first and third series were infective.

In experiment 3, 2,336 first generation ticks were tested. Progeny of the first oviposition failed to produce an infection through three test feedings but ticks from the second oviposition caused infection at the second test feeding and ticks from the third oviposition at the first test feeding.

ORNITHODOROS HERMSI

November 9, 1939, and October 18, 1940, 35 and 114 ticks, respectively, were given infective feedings. Transmissions were first obtained at the second test feeding. Ticks from experiment 1 caused typical infections by feeding 772 days following this infective feeding and 979 days by injection. Similarly, ticks in experiment 2 produced typical infections by feeding 595 days after the infective feeding and 599 days by injection.

Transmission through the ovum.—Five hundred seventy-three ticks from experiment 1 and 318 from experiment 2 (first oviposition) were noninfective by feeding or injection. One hundred unfed larvae (experiment 1, second oviposition) were proved infective by injection.

DISCUSSION

O. moubata is widely distributed in Africa from the east to the west across the central portion, and as far south as the Transvaal. The tick is reported to be common in rest houses along the routes of

travel and has been found recently in Southwest Africa and in the mining districts of the Union of South Africa (Ordman, 1939, 1941). Its hosts are domestic animals and man, and Bedford (vide Ordman) reports it as a parasite of the tortoise. It is the chief tick vector of relapsing fever in these areas. Although Q fever has not been reported from Africa, the facility with which this species transmits the infecting agent, without obvious harm to the tick, suggests that it may be a natural vector. Infected females oviposit as regularly and produce as many viable progeny as do noninfected females. Ticks given an infective feeding in the first nymphal stage failed in transmission until the adult stage was reached, while in the F1 generation the first test feeding resulted in infection.

O. hermsi is known in six of the western States, viz, California, Oregon, Idaho, Nevada, Colorado, and Washington. Its hosts are chiefly chipmunks (*Eutamias* spp.), pine squirrels (*Tamiasciurus* spp.), and man. It is a vector of relapsing fever in these six States. It comes in contact with man mainly in cabins and mountain homes so constructed as to afford nesting places for rodents. It has also been collected in relatively large numbers from "snags" and decaying logs.

In contrast with the results obtained with *O. moubata* and *O. hermsi*, both *O. turicata* and *O. parkeri* have failed in transmission although the organisms remain infective in *O. turicata* for 1,001 days as shown by injection. Transmission through the egg was not demonstrated (Davis, 1940). In a similar study of *O. parkeri* with the Wyoming strain the organism remained infective for 852 days following the infective feeding and 379 days following the last feeding, as demonstrated by injection, but was not transmitted by feeding. Using *O. turicata* and an Australian strain of Q fever, a typical infection with subsequent immunity was obtained by the injection of one tick 647 days after the infective feeding (Davis, unpublished data).

SUMMARY

O. moubata, engorged as first nymphs on a guinea pig infected with American Q fever, transmitted the infecting agent *by feeding* up to 428 days following the infective feeding and conserved the agent in its tissues for 670 days, as shown by injection.

O. hermsi transmitted the infective agent up to 772 days *by feeding* and conserved the agent in its tissues for 979 days, as shown by injection.

Transmission through the egg to the F2 generation was obtained with *O. moubata* but failed in *O. hermsi*, by feeding, in less extensive experiments.

Long periods of fasting did not decrease the virulence of the infecting organism.

REFERENCES

(1) Davis, Gordon E.: *Rickettsia diaporica:* Recovery of three strains from *Dermacentor andersoni* collected in southeastern Wyoming. Their identity with Montana strain 1. Pub. Health Rep., 54: 2219–2227 (1939).
(2) ————: *Rickettsia diaporica:* Its persistence in the tissues of *Ornithodoros turicata.* Pub. Health Rep., 55: 1862–64 (1940).
(3) Ordman, David: African relapsing fever in South Africa. An outbreak of African relapsing fever in the Cape Province. South African Med. J., 13: 491–498 (1939).
(4) ————: The occurrence of relapsing fever and the geographical distribution of *Ornithodoros moubata* in South Africa. South African Med. J., 15: 383–388 (1941).

INCIDENCE OF HOSPITALIZATION, MAY 1943

Through the cooperation of the Hospital Service Plan Commission of the American Hospital Association, data on hospital admissions among about 8,000,000 members of Blue Cross Hospital Service Plans are presented monthly. These plans provide prepaid hospital service. The data cover about 60 hospital service plans scattered throughout the country, mostly in large cities

Item	May	
	1942	1943
1. Number of plans supplying data	61	68
2. Number of persons eligible for hospital care	7,885,482	9,935,638
3. Number of persons admitted for hospital care	67,846	82,446
4. Incidence per 1,000 persons, annual rate, during current month (daily rate x 365)	101.2	97.7
5. Incidence per 1,000 persons, annual rate for the 12 months ended May 31	106.9	106.4

DEATHS DURING WEEK ENDED JUNE 12, 1943

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended June 12, 1943	Corresponding week, 1942
Data for 88 large cities of the United States:		
Total deaths	9,074	8,090
Average for 3 prior years	7,951	
Total deaths, first 23 weeks of year	223,507	202,603
Deaths under 1 year of age	618	568
Average for 3 prior years	528	
Death under 1 year of age, first 23 weeks of year	15,431	12,974
Data from industrial insurance companies:		
Policies in force	65,560,734	64,975,834
Number of death claims	12,012	10,860
Death claims per 1,000 policies in force, annual rate	9.6	8.7
Death claims per 1,000 policies, first 23 weeks of year, annual rate	10.[illegible]	9.9

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JUNE 19, 1943

Summary

Seasonal decrease in the incidence of six of the nine common communicable diseases included in the following table were recorded in reports for the current week, namely, diphtheria, influenza, measles, meningococcus meningitis, scarlet fever, and smallpox. A sharp increase was shown in the total number of poliomyelitis cases reported (chiefly in California and Texas), and slight increases were noted in the totals for typhoid fever and whooping cough.

Of the total of 99 cases of poliomyelitis reported for the week, as compared with 60 for the preceding week and 38 for the 5-year (1938-42) median, 47 occurred in California and 29 in Texas. No other State reported more than 3 cases. To date, 758 cases have been reported—more than for the corresponding period of any prior year since 1934. Of the total cases to date, approximately one-half have occurred in California and Texas.

A further decline occurred in the number of reported cases of meningococcus meningitis—from 382 for the preceding week to 327 for the current week—but increases were shown in a number of States. A total of 11,431 cases has been reported to date this year.

Included in other reports for the week (figures for the corresponding week of last year in parentheses) were the following: Anthrax, 2 (2); dysentery, all forms, 582 (633); infectious encephalitis, 5 (8); leprosy, 1 (1); Rocky Mountain spotted fever, 18 (18); tularemia, 23 (32); endemic typhus fever, 73 (70). Confirmation was received of a delayed report of a fatal case of epidemic typhus fever in Yakima County, Washington, in May. The case occurred in a laborer who had recently arrived from Mexico.

Deaths reported for the week in 90 large cities of the United States totaled 8,391, as compared with 9,138 last week and a 3-year (1940-42) average of 7,745. The accumulated number for the first 24 weeks of 1943 is 233,348, as compared with 211,629 for the same period of 1942.

Telegraphic morbidity reports from State health officers for the week ended June 19, 1943, and comparison with corresponding week of 1942 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occurred

Division and State	Diphtheria: Week ended— June 19, 1943	Diphtheria: Week ended— June 20, 1942	Diphtheria: Median 1938–42	Influenza: Week ended— June 19, 1943	Influenza: Week ended— June 20, 1942	Influenza: Median 1938–42	Measles: Week ended— June 19, 1943	Measles: Week ended— June 20, 1942	Measles: Median 1938–42	Meningitis, meningococcus: Week ended— June 19, 1943	Meningitis, meningococcus: Week ended— June 20, 1942	Meningitis, meningococcus: Median 1938–42
NEW ENGLAND												
Maine	1	1	1	1	-----	1	182	54	81	5	0	0
New Hampshire	0	0	0	-----	-----	-----	18	8	20	2	0	0
Vermont	0	0	0	-----	-----	-----	217	171	74	0	0	0
Massachusetts	2	0	2	-----	-----	-----	1,098	851	1,015	31	2	1
Rhode Island	0	3	0	1	-----	-----	148	130	26	6	1	0
Connecticut	1	0	0	-----	-----	1	246	233	233	6	0	1
MIDDLE ATLANTIC												
New York	6	17	14	[1]1	-----	[1]1	2,842	985	1,511	56	11	4
New Jersey	2	0	6	4	2	4	1,992	529	547	13	6	1
Pennsylvania	11	3	14	-----	3	-----	721	377	496	17	4	4
EAST NORTH CENTRAL												
Ohio	2	2	9	13	9	9	407	138	138	14	1	1
Indiana	0	2	4	3	1	2	206	58	58	4	0	0
Illinois	16	21	19	1	7	7	973	148	223	21	3	2
Michigan [2]	1	7	4	1	-----	1	3,217	285	793	17	0	1
Wisconsin	1	1	1	13	13	15	2,070	996	1,111	1	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	1	1	-----	2	295	496	138	3	0	0
Iowa	0	0	2	-----	-----	1	130	159	159	2	0	0
Missouri	2	1	2	3	-----	1	153	67	50	8	3	0
North Dakota	1	1	1	-----	-----	-----	30	17	17	0	0	0
South Dakota	0	0	0	-----	-----	-----	74	28	2	0	0	0
Nebraska	2	0	1	11	-----	-----	42	84	84	0	0	0
Kansas	3	1	3	3	-----	1	165	112	179	4	1	0
SOUTH ATLANTIC												
Delaware	0	0	0	-----	-----	-----	15	4	5	0	0	0
Maryland [2]	3	5	3	1	1	1	187	116	116	11	7	1
Dist. of Col.	0	1	1	-----	-----	-----	74	47	47	3	0	0
Virginia	4	3	6	31	75	34	152	93	298	13	6	1
West Virginia	0	2	2	-----	1	7	32	12	14	0	0	1
North Carolina	7	4	5	-----	1	-----	190	251	288	7	2	1
South Carolina	16	6	3	133	118	105	74	59	50	4	0	0
Georgia	3	8	3	4	10	9	132	30	60	6	1	0
Florida	1	8	3	8	1	1	24	80	47	3	1	0
EAST SOUTH CENTRAL												
Kentucky	3	1	2	3	-----	1	56	35	65	8	1	1
Tennessee	4	1	2	9	10	21	79	62	85	3	1	1
Alabama	2	1	1	24	40	14	180	44	76	1	2	1
Mississippi [2]	1	6	3	-----	-----	-----	-----	-----	-----	1	0	0
WEST SOUTH CENTRAL												
Arkansas	6	3	3	6	5	8	46	37	37	1	0	0
Louisiana	2	5	5	6	2	9	19	25	14	1	2	2
Oklahoma	2	2	2	4	4	15	8	45	69	1	0	0
Texas	21	21	21	348	168	138	171	327	327	17	4	2
MOUNTAIN												
Montana	1	1	1	2	1	-----	115	70	56	0	1	0
Idaho	0	0	0	-----	-----	-----	31	12	18	1	0	0
Wyoming	0	0	1	20	61	-----	41	80	34	0	0	0
Colorado	8	10	10	14	20	20	64	123	107	1	0	0
New Mexico	2	0	2	-----	-----	-----	5	8	64	0	0	0
Arizona	0	1	1	38	24	83	17	38	38	1	0	0
Utah [2]	0	0	0	8	-----	-----	79	537	222	3	0	0
Nevada	0	0	-----	-----	-----	-----	3	10	-----	0	0	-----
PACIFIC												
Washington	4	2	2	2	1	-----	158	645	187	6	1	0
Oregon	0	2	0	9	12	12	85	116	56	2	0	0
California	16	11	20	42	40	40	809	3,648	1,017	23	8	3
Total	152	154	182	763	630	641	18,102	12,480	12,480	327	64	36
24 weeks	5,823	6,051	7,427	76,277	77,305	148,631	485,042	435,636	435,636	11,431	1,855	1,130

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended June 19, 1943, and comparison with corresponding week of 1942 and 5-year median—Continued

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42	Week ended—		Median 1938–42
	June 19, 1943	June 20, 1942		June 19, 1943	June 20, 1942		June 19, 1943	June 20, 1942		June 19, 1943	June 20, 1942	
NEW ENGLAND												
Maine	0	0	0	18	8	6	0	0	0	6	0	1
New Hampshire	0	0	0	3	3	3	0	0	0	0	0	0
Vermont	0	0	0	2	4	4	0	0	0	0	0	0
Massachusetts	2	0	0	328	162	157	0	0	0	4	2	1
Rhode Island	1	1	0	19	9	6	0	0	0	0	1	1
Connecticut	0	0	0	53	17	45	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	2	3	2	288	137	348	0	0	0	10	5	9
New Jersey	1	3	1	56	66	101	0	0	0	5	0	2
Pennsylvania	1	2	1	107	121	186	0	0	0	6	9	9
EAST NORTH CENTRAL												
Ohio	0	0	0	92	95	155	1	2	2	0	4	5
Indiana	0	0	0	12	17	43	2	5	5	2	0	3
Illinois	0	1	1	68	64	173	1	10	10	7	7	6
Michigan [3]	1	0	0	76	129	211	1	0	1	1	0	2
Wisconsin	1	0	0	163	73	79	0	0	1	0	1	1
WEST NORTH CENTRAL												
Minnesota	0	2	0	31	24	43	0	1	1	0	0	0
Iowa	0	0	0	16	14	28	0	1	10	0	2	1
Missouri	1	1	0	25	22	38	0	1	2	5	5	5
North Dakota	0	0	0	1	3	3	1	0	3	0	0	0
South Dakota	0	0	0	8	5	5	0	0	3	0	0	0
Nebraska	0	0	0	6	5	6	0	0	1	0	0	0
Kansas	1	1	0	23	26	25	0	2	2	2	1	2
SOUTH ATLANTIC												
Delaware	0	1	0	3	5	5	0	0	0	0	0	0
Maryland [3]	0	1	0	60	13	20	0	0	0	0	1	2
District of Columbia	0	0	0	10	2	5	0	0	0	1	1	1
Virginia	2	2	0	14	11	16	0	0	0	2	3	3
West Virginia	0	0	0	13	8	20	0	0	0	3	7	3
North Carolina	0	0	0	9	11	11	0	0	0	1	4	7
South Carolina	0	1	1	1	1	0	0	0	0	5	2	2
Georgia	0	1	1	7	5	6	0	0	0	10	12	12
Florida	0	1	1	1	1	2	0	0	0	1	0	4
EAST SOUTH CENTRAL												
Kentucky	0	2	1	11	23	21	0	0	0	2	2	5
Tennessee	0	0	1	14	17	21	0	2	1	3	3	3
Alabama	0	1	1	7	7	7	0	0	0	6	5	5
Mississippi [3]	0	0	0	2	4	4	0	0	0	1	0	2
WEST SOUTH CENTRAL												
Arkansas	3	3	0	0	7	4	0	1	1	4	10	7
Louisiana	[3] 2	2	1	2	3	6	0	0	0	6	7	11
Oklahoma	1	0	0	7	2	9	0	1	2	0	3	10
Texas	29	2	2	21	18	18	1	1	1	15	16	16
MOUNTAIN												
Montana	0	1	0	3	6	8	0	0	0	1	2	0
Idaho	0	0	0	55	0	2	0	0	0	0	0	0
Wyoming	1	0	0	19	7	3	0	0	0	0	0	0
Colorado	0	0	0	42	8	20	0	1	1	1	0	2
New Mexico	0	2	0	1	4	5	0	0	0	1	0	3
Arizona	1	0	0	12	5	3	0	0	0	1	0	1
Utah [3]	1	2	0	18	8	8	0	0	0	0	0	0
Nevada	0	0	------	0	0	------	0	0	------	0	0	------
PACIFIC												
Washington	1	0	0	21	21	21	0	0	1	0	0	3
Oregon	0	0	0	20	1	9	0	0	1	1	0	1
California	47	2	6	129	73	98	0	0	0	4	3	5
Total	99	38	38	1,897	1,275	2,031	7	28	78	117	118	161
24 weeks	[3] 758	514	560	89,533	82,084	107,943	560	542	1,685	1,542	2,057	2,242

See footnotes at end of table.

***Telegraphic morbidity reports from State health officers for the week ended June 19, 1943, and comparison with corresponding week of 1942 and 5-year median*—Continued**

Division and State	Whooping cough			Week ended June 19, 1943								
	Week ended—		Median 1938–42	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	June 19, 1943	June 20, 1942			Amebic	Bacillary	Unspecified					
NEW ENGLAND												
Maine	36	22	22	0	0	1	0	0	0	0	0	0
New Hampshire	3	5	2	0	0	0	0	0	0	0	0	0
Vermont	20	78	45	0	0	0	0	0	0	0	0	0
Massachusetts	98	268	156	0	0	1	0	0	0	0	0	0
Rhode Island	33	20	19	0	0	0	0	0	0	0	0	0
Connecticut	44	102	81	0	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	224	446	427	0	2	4	0	1	0	0	0	0
New Jersey	169	453	182	0	0	0	0	1	0	1	0	0
Pennsylvania	237	198	257	0	0	1	0	2	0	0	0	0
EAST NORTH CENTRAL												
Ohio	137	172	300	0	1	0	0	1	0	1	0	0
Indiana	71	37	34	0	0	0	0	0	0	1	0	0
Illinois	129	232	179	0	0	0	3	0	0	0	0	0
Michigan [2]	281	169	237	0	0	0	0	0	0	0	0	0
Wisconsin	228	207	144	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	83	25	28	0	3	0	0	0	1	0	0	0
Iowa	41	12	24	0	0	0	0	0	0	0	0	0
Missouri	40	8	18	0	0	0	0	0	0	0	2	0
North Dakota	1	2	15	0	0	0	0	0	0	0	2	0
South Dakota	3	2	2	0	0	0	0	0	0	0	0	0
Nebraska	22	11	11	0	0	0	0	0	0	0	0	0
Kansas	72	33	43	0	1	0	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	2	1	7	0	0	0	0	0	0	2	0	0
Maryland [2]	147	64	64	0	0	0	1	0	0	1	0	0
Dist. of Col.	29	17	16	0	0	0	0	0	0	0	0	0
Virginia	159	97	97	0	0	0	85	0	0	1	0	0
West Virginia	95	18	31	0	0	0	0	0	0	0	0	0
North Carolina	388	168	203	0	0	1	0	0	0	2	0	0
South Carolina	140	66	73	0	0	1	0	0	0	0	0	1
Georgia	90	29	29	0	3	18	5	0	0	0	1	27
Florida	26	11	26	0	11	0	0	0	0	0	0	11
EAST SOUTH CENTRAL												
Kentucky	39	48	48	0	0	10	0	0	0	0	0	0
Tennessee	64	28	59	0	0	0	11	0	0	1	3	0
Alabama	82	53	53	2	0	0	0	0	0	0	1	10
Mississippi [2]	-----	-----	-----	0	0	0	0	0	0	0	2	0
WEST SOUTH CENTRAL												
Arkansas	26	17	25	0	4	55	0	0	0	0	7	0
Louisiana	14	9	9	0	1	8	0	0	0	0	0	1
Oklahoma	45	10	25	0	0	0	0	0	0	0	0	0
Texas	497	201	261	0	11	291	0	0	0	0	0	22
MOUNTAIN												
Montana	24	16	13	0	0	0	0	0	0	2	5	0
Idaho	0	1	7	0	0	0	0	0	0	0	0	0
Wyoming	3	2	3	0	0	0	0	0	0	3	0	0
Colorado	18	25	29	0	1	1	0	0	0	0	0	0
New Mexico	10	18	18	0	0	1	1	0	0	1	0	0
Arizona	23	11	34	0	0	0	34	0	0	0	0	0
Utah [2]	91	28	97	0	0	0	0	0	0	2	0	0
Nevada	3	4	-----	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	35	40	56	0	0	0	0	0	0	0	0	[4] 0
Oregon	27	29	17	0	0	0	0	0	0	0	0	0
California	292	208	349	0	2	9	0	0	0	0	0	[illegible]
Total	4,341	3,721	3,721	2	40	402	140	5	1	18	23	73
24 weeks	97,600	91,802	94,166	33	809	5,292	1,367	263	12	126	438	1,134
24 weeks, 1942	-----	-----	-----	37	464	2,469	1,322	209	31	166	459	896

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Later information shows 1 case of poliomyelitis in Louisiana for the week ended May 29 instead of none as previously reported.
[4] Delayed report 1 fatal case of epidemic typhus fever (imported case) in Yakima County, during May. (See p. 995.)

WEEKLY REPORTS FROM CITIES

City reports for week ended June 5, 1943

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	70	6	1	0	0	0	0	12
New Hampshire:												
Concord	0	0	------	0	0	0	2	1	1	0	0	0
Vermont:												
Barre	0	0	------	0	0	0	0	0	0	0	0	0
Massachusetts:												
Boston	0	0	------	0	[illegible]	11	19	0	158	0	0	30
Fall River	0	0	------	0	88	1	0	0	2	0	0	3
Springfield	0	0	------	0	19	0	2	0	32	0	0	0
Worcester	0	0	------	0	50	3	6	0	11	0	0	1
Rhode Island:												
Providence	0	0	------	0	71	1	1	0	11	0	0	17
Connecticut:												
Bridgeport	0	0	------	0	7	1	0	0	2	0	0	3
Hartford	0	0	------	0	18	1	1	0	2	0	0	2
New Haven	0	0	------	1	39	1	1	0	1	0	0	0
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	2	74	1	8	0	6	0	0	7
New York	14	1	4	0	1,323	43	60	0	205	0	5	76
Rochester	0	0	------	0	112	1	8	0	6	0	0	14
Syracuse	0	0	------	0	45	1	0	0	5	0	0	20
New Jersey:												
Camden	0	0	------	2	1	1	0	0	1	0	0	2
Newark	0	0	2	0	360	5	7	0	8	0	0	37
Trenton	0	0	------	0	9	0	1	0	2	0	0	0
Pennsylvania:												
Philadelphia	1	0	1	0	175	16	20	0	78	0	0	46
Pittsburgh	0	1	------	0	22	2	10	1	6	0	0	26
Reading	0	0	------	0	18	0	0	0	0	0	0	8
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	------	0	57	2	2	0	18	0	0	7
Cleveland	0	0	2	0	22	4	11	0	47	0	1	36
Columbus	0	0	1	1	52	0	0	0	7	0	0	1
Indiana:												
Fort Wayne	0	0	------	0	6	0	3	0	0	0	0	0
Indianapolis	0	0	------	2	74	0	4	0	16	0	0	14
South Bend	0	0	------	0	10	0	0	0	0	0	0	3
Terre Haute	0	0	------	0	5	0	2	0	0	0	0	2
Illinois:												
Chicago	24	0	3	5	611	14	28	0	60	0	0	57
Springfield	0	0	------	0	8	0	1	0	1	0	0	0
Michigan:												
Detroit	3	0	------	0	1,218	12	7	0	17	0	0	73
Flint	0	0	------	0	13	0	0	0	0	0	0	0
Grand Rapids	1	0	------	0	93	0	0	0	4	0	0	13
Wisconsin:												
Kenosha	0	0	------	0	3	0	1	0	4	0	0	2
Milwaukee	0	0	1	1	481	1	1	0	138	0	0	54
Racine	0	0	------	0	3	0	2	0	17	0	0	0
Superior	0	0	------	0	33	0	1	0	0	0	0	1
WEST NORTH CENTRAL												
Minnesota:												
Duluth	1	0	------	1	83	0	0	0	2	0	0	0
Minneapolis	1	0	------	0	257	0	3	0	14	0	0	9
St. Paul	0	0	------	0	30	0	4	0	3	0	0	57
Missouri:												
Kansas City	0	0	------	0	108	0	6	0	21	0	1	8
St. Joseph	0	0	------	0	9	0	2	0	0	0	0	0
St. Louis	0	0	------	0	42	5	10	0	5	0	0	16

City reports for week ended June 5, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo	0	0		0	4	0	0	0	6	0	0	0
Nebraska:												
Omaha	0	0		0	4	0	3	0	3	0	0	0
Kansas:												
Topeka	0	0		0	34	0	1	0	1	0	0	11
Wichita	1	0		0	2	0	1	0	2	0	0	5
SOUTH ATLANTIC												
Delaware:												
Wilmington	1	0		0	15	1	1	0	1	0	0	4
Maryland:												
Baltimore	2	0	2	1	94	10	10	0	41	0	0	76
Cumberland	0	0		0	0	1	0	0	0	0	0	0
Frederick	0	0		0	0	0	0	0	0	0	0	0
District of Columbia:												
Washington	0	0		0	84	5	6	0	8	0	5	30
Virginia:												
Lynchburg	1	0		0	8	0	0	0	0	0	1	5
Richmond	0	0	1	0	24	0	2	0	3	0	0	22
Roanoke	0	0		0	0	0	0	0	0	0	0	0
West Virginia:												
Charleston	0	0		0	1	0	0	0	0	0	0	0
Wheeling	0	0		0	0	1	0	0	0	0	0	1
North Carolina:												
Raleigh	0	0		0	5	0	1	0	0	0	0	0
Winston-Salem	0	0		0	0	0	1	0	0	0	0	21
South Carolina:												
Charleston	0	0		0	1	0	2	0	0	0	0	0
Georgia:												
Atlanta	1	0		0	28	2	6	0	3	0	1	7
Brunswick												
Savannah	0	0		0	2	1	0	0	0	0	1	0
Florida:												
Tampa	0	0		0	1	0	2	0	0	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0		0	59	0	5	0	0	0	0	8
Nashville	0	0		1	8	0	3	0	2	0	0	4
Alabama:												
Birmingham	0	0	3	0	13	0	2	0	2	0	0	3
Mobile	0	0	1	0	2	0	2	0	0	0	0	0
WEST SOUTH CENTRAL												
Louisiana:												
New Orleans	0	0	7	2	6	2	4	0	1	0	1	2
Shreveport	0	0		1	0	0	5	0	0	0	0	0
Texas:												
Dallas	0	0		0	1	0	2	0	1	0	1	9
Galveston	1	0		0	1	0	3	0	0	0	0	4
Houston	0	0		0	4	0	6	1	0	1	0	5
San Antonio	0	0	1	1	0	0	7	0	1	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0		0	7	0	0	0	0	0	0	0
Great Falls	0	0		0	14	0	0	0	2	0	0	5
Helena	0	0		0	15	0	0	0	0	0	0	0
Missoula	0	0		0	0	0	0	0	0	0	0	0
Idaho:												
Boise	0	0		0	0	0	0	0	0	0	0	0
Colorado:												
Denver	3	0	1	0	90	0	4	0	8	0	0	5
Pueblo	0	0		0	6	0	0	0	0	0	0	4
Utah:												
Salt Lake City	0	0		0	54	0	1	0	7	0	0	27

City reports for week ended June 5, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	0	0	------	0	92	2	0	0	2	0	0	12
Spokane	0	0	------	0	5	0	4	0	4	0	0	2
Tacoma	1	0	------	0	3	1	0	0	0	0	0	0
California:												
Los Angeles	1	0	14	0	121	3	7	4	17	0	0	48
Sacramento	0	1	------	0	3	0	3	0	0	0	0	23
San Francisco	2	0	3	0	47	5	11	1	20	0	0	23
Total	59	3	47	22	6,790	167	340	8	1,040	1	17	1,019
Corresponding week, 1942	59	4	36	12	4,693	33	284	6	938	0	21	1,297
Average, 1938–42	75	------	49	[1] 15	[2] 4,818	------	[1] 285	------	1,158	9	26	1,221

Anthrax.—Cases: Philadelphia, 1; Seattle, 1.
Dysentery, amebic.—Cases: New York, 2; Philadelphia, 1; Richmond, 1.
Dysentery, bacillary.—Cases: Buffalo, 1; New York, 1; Winston-Salem, 1; Charleston, S. C., 18; Atlanta, 1; Los Angeles, 11.
Dysentery, unspecified.—Cases: Richmond, 3; San Antonio, 12; Sacramento, 1.
Rocky Mountain spotted fever.—Cases: Missoula, 1
Typhus fever—Cases: Dallas, 1; San Antonio, 2.

[1] 3-year average, 1940–42
[2] 5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (estimated population, 1942, 34,627,700)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	0.0	0.0	0.0	2.5	1,414	62.1	82.0	2.5	547	0.0	0.0	169
Middle Atlantic	6.7	0.9	3.1	2.2	957	31.2	50.8	0.4	141	0.0	2.2	105
East North Central	16.4	0.0	4.1	5.3	1,570	19.3	36.8	0.0	192	0.0	0.6	154
West North Central	5.9	0.0	0.0	2.0	1,120	9.8	58.6	0.0	100	0.0	2.0	207
South Atlantic	8.5	0.0	5.1	1.7	449	35.9	53.0	0.0	96	0.0	13.7	284
East South Central	0.0	0.0	23.8	5.9	487	0.0	71.3	0.0	24	0.0	0.0	59
West South Central	3.1	0.0	24.9	12.4	37	6.2	83.9	3.1	9	3.1	6.2	65
Mountain	24.1	0.0	8.0	0.0	1,495	0.0	40.2	0.0	137	0.0	0.0	330
Pacific	7.0	1.7	29.7	0.0	474	19.2	43.7	8.7	75	0.0	0.0	189
Total	8.9	0.5	7.1	3.3	1,022	25.1	51.2	1.2	157	0.2	2.6	153

PLAGUE INFECTION IN MONTEREY COUNTY, CALIFORNIA

Plague infection has been eported proved in a pool of 21 fleas from 9 meadow mice, *Microtus* sp., collected March 23 from the Fort Ord Military Reservation, 12 miles southwest of Salinas, Monterey County, Calif.

FATAL CASE OF EPIDEMIC TYPHUS FEVER IN YAKIMA COUNTY, WASHINGTON

A delayed report has been received of a fatal case of epidemic typhus fever which occurred in Yakima County, Wash., during May. The case was in a Mexican laborer who arrived in Yakima County on April 20. About 10 days after his arrival, he became ill; and, as his condition became progressively worse, he was taken to the hospital in Yakima, where he died on May 22. The diagnosis of epidemic typhus fever was made from clinical manifestations and substantiated by the agglutination test.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—During the week ended May 15, 1943, two rats found in Honokaa area, Hamakua District, Island of Hawaii, T. H., were proved positive for plague.

Virgin Islands of the United States

Notifiable diseases—January–March 1943.—During the months of January, February, and March 1943, cases of certain notifiable diseases were reported in the Virgin Islands as follows:

Disease	January	February	March
Chickenpox	1	5	1
Filariasis	7	4	3
Gonorrhea	11	13	8
Hookworm disease	2	5	6
Lymphogranuloma inguinale			1
Malaria	2	3	
Mumps	4	1	
Pneumonia			1
Schistosomiasis			2
Syphilis	26	16	23
Tuberculosis	1		
Whooping cough	10	16	4

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended May 22, 1943.—During the week ended May 22, 1943, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	3	9	2	162	257	42	28	17	97	617
Diphtheria		10	2	25		6		4		47
Dysentery (bacillary)				2			3	1		6
Encephalitis (infectious)						1				1
German measles		1		30	110	16	7	45	18	227
Influenza		2			36	17	2		11	68
Measles		46		328	1,608	124	90	202	465	2,863
Meningitis, meningococcus				3	1				2	6
Mumps	2	69	1	40	623	114	43	74	132	1,098
Poliomyelitis				1						1
Scarlet fever	3	22	6	87	209	51	19	69	32	498
Tuberculosis (all forms)	3	22	2	146	63	11	22	12		281
Typhoid and paratyphoid fever				13	1					14
Undulant fever					1					1
Whooping cough			1	163	151	68	17	38	96	534

JAMAICA

Vital statistics—1941.—Following are vital statistics for Jamaica for the year 1941:

Number of births	39,829
Number of births per 1,000 population	30.75
Deaths, all causes	17,317
Deaths, all causes per 1,000 population	14.07
Deaths under 2 years of age per 1,000 live births	103.9
Deaths from:	
Appendicitis	37
Black water fever	12
Cancer and other malignant tumors	418
Congenital debility	1,171
Diarrhea and enteritis	356
Deaths from—Continued.	
Infantile convulsions	1,015
Intestinal obstruction	78
Leprosy	13
Malaria	603
Nephritis, chronic	804
Pneumonia	719
Rheumatic fever	126
Senility	1,563
Syphilis	534
Tuberculosis, respiratory	946
Typhoid fever	160

SWEDEN

Notifiable diseases—March 1943.—During the month of March 1943, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	4	Poliomyelitis	9
Diphtheria	357	Scarlet fever	2,356
Dysentery	69	Syphilis	63
Epidemic encephalitis	1	Typhoid fever	3
Gonorrhea	1,219	Undulant fever	6
Paratyphoid fever	22	Weil's disease	9

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given

CHOLERA

[C indicates cases

NOTE —Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates

Place		January-March 1943	April 1943	May 1943—week ended - 1	8	15	22	29
ASIA								
Ceylon	C	47				1		
India	C	78,779	4,244					
Calcutta	C	547	307	102		66		
Madras	C	962	2					
Vizagapatam	C	4						

PLAGUE

[C indicates cases, D, deaths, P, present]

Place		January-March 1943	April 1943	May 1943—week ended - 1	8	15	22	29
AFRICA								
Basutoland	C	4						
Belgian Congo—Plague-infected rats		P						
British East Africa								
Kenya	C	10	1					
Uganda	C	6						
Madagascar	C	17						
Morocco	C	47	7					
Senegal	C				[1] 20		[2] 24	
Union of South Africa	C	62						
ASIA								
India	C	1,026	99	45	17	5		
Indochina	C	4						
Palestine	C	[3] 8						
SOUTH AMERICA								
Peru:								
Lambayeque Department	C	2						
Libertad Department	C	9						
Lima Department	C	3						
Lima	C	1						
Plague-infected rats		P						
OCEANIA								
Hawaii Territory:								
Hamakua District	D	2	1		1			
Plague-infected rats		47	3	[4] 2	2			

[1] For the period May 1-10, 1943.
[2] For the period May 11-20, 1943.
[3] In Jaffa and vicinity.
[4] Plague-infected mice.

COURT DECISION ON PUBLIC HEALTH

Trichinosis—liability of retail seller of sausage.—(Maryland Court of Appeals; *Vaccarino* v. *Cozzubo*, 31 A.2d 316; decided April 8, 1943.) An action to recover damages for breach of an alleged implied warranty was brought against a retail seller of sausage. The sausage was purchased by the plaintiff's 11-year-old daughter and his wife cooked it for supper. Six days later the plaintiff became ill and several days after that his wife and daughter also became ill. Their illness was diagnosed as trichinosis. In the trial court a jury rendered a verdict in favor of the plaintiff, and the defendant appealed to the Court of Appeals of Maryland.

With respect to whether privity of contract existed between the plaintiff and the defendant, the appellate court held that such privity did exist, saying that the plaintiff's wife and daughter were acting as his agents in helping him to carry out his obligation to support and maintain the family.

The principal issue presented, however, was whether the trial court had properly instructed the jury as to the liability of the storekeeper to the purchaser. The court reviewed the pertinent provisions of the statute relating to sales and stated that it was absolutely clear that there was an implied warranty that the sausage was of merchantable quality and reasonably fit for human consumption. However, said the court, no implied warranty arises either at common law or under the statute that meat, generally fit to be eaten only when properly cooked, is wholesome when eaten raw or cooked in an unusual or improper manner, and "it would be unfair to impose upon a retail meat dealer an implied warranty that his pork is fit to be eaten when raw." According to the court this was especially true in view of the fact that the danger of contracting trichinosis from eating pork could be eliminated through proper cooking. It was the court's opinion that the implied warranty in the case was not that the sausage was wholesome and fit to be eaten either cooked or raw but that it was wholesome and fit to be eaten after ordinary domestic cooking. The trial court had instructed the jury that if they found that the plaintiff was infected with trichinosis as a result of eating the sausage the verdict should be for the plaintiff, but the court of appeals took the view that the jury should have been authorized to give a verdict for the plaintiff only in case they found that the plaintiff was infected with trichinosis by eating the sausage after it was cooked in the usual or proper manner.

The judgment in the plaintiff's favor was reversed.

×

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF SANITARY REPORTS AND STATISTICS

E. R. COFFEY, *Assistant Surgeon General, Chief of Division*

THE PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Sanitary Reports and Statistics, pursuant to the following authority of law: United States Code, title 42, sections 7, 30, 93; title 44, section 220.

It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, United States Public Health Service, Washington, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request.

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1943

For sale by the Superintendent of Documents, Washington, D. C.

Price 5 cents. Subscription price $2.50 a year